

# Rock Products

DEVOTED TO  
Concrete and Manufactured  
Building Materials

Volume XI.

CHICAGO, ILL., MAY 22, 1912.

Number 11.

**CAROLINA PORTLAND CEMENT COMPANY**

We are the largest distributors of Portland Cement, Lime Plaster, Fire-brick and General Building Material in the Southern States, and have stocks of Standard Brands at all of the Atlantic and Gulf Seaports, and at our interior mills and warehouses, for prompt and economical distribution to all Southern territory. Write for our delivered prices anywhere. Also Southern agents for the "Dehydratine's" waterproofing material. "Universal," "Acme" and "Electroid" Brands Ready Roofing. Get our prices.

Charleston, S. C. Birmingham, Ala. Atlanta, Ga. New Orleans, La.

**DEXTER** Portland Cement  
THE NEW STANDARD

Sole Agents **SAMUEL H. FRENCH & CO.** PHILADELPHIA


**UNION MINING COMPANY**

Manufacturers of the Celebrated

DEVOTE a special department to the manufacture of Brick particularly adapted both physically and chemically to

**Lime Kiln and Cement Kiln Construction**

Large stock carried. Prompt shipments made. Write for quotations on Standard and Special shapes, to

**UNION MINING CO.,**  
Mount Savage, Md.

CAPACITY, 60,000 PER DAY.  
ESTABLISHED 1841.

**MOUNT SAVAGE**  
FIRE BRICK  
GOVERNMENT STANDARD.

**ULTRA HIGH GRADE**

USED BY U.S. GOVERNMENT, RAILROADS, CITIES, STEEL PLANTS

GUARANTEED TO MEET ALL GOVERNMENT AND STANDARD REQUIREMENTS

**STANDARD**

SALES OFFICE  
BIRMINGHAM, ALA.

WRITE FOR PRICES

**Special Feature in This Number**

Concrete Road Discussion Before  
The Association of American  
Portland Cement Manufacturers



**FOR GRIFFIN  
TUBE AND  
BALL MILLS**

Branches:

**CHICAGO BELTING CO.****PURE OAK TANNED LEATHER BELTING**

Send for Our Illustrated Catalog

**111 North Green St., CHICAGO****NEW YORK****PHILADELPHIA****NEW ORLEANS****PORTLAND, OREGON**

**FOR  
DAMP  
PLACES**

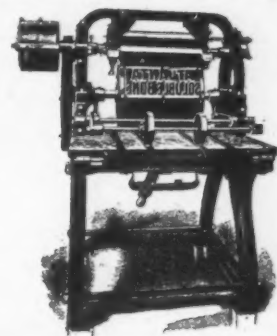
**KOEHLER BAG PRINTER**

is not only the fastest bag printer on the market---but the best and cheapest as well.

Write to us today for full particulars and prices. Hundreds of them in daily use giving perfect satisfaction.

**The Henry L. Koehler Manufacturing Co.**

410 W. Main Street, Louisville, Kentucky



**Phoenix Portland Cement** UNEXCELLED FOR ALL USES.  
Manufactured by  
**PHOENIX PORTLAND CEMENT CO.**  
NAZARETH, PA.

Sole Selling Agent, **WILLIAM G. HARTRANFT CEMENT CO.**  
Real Estate Trust Building, PHILADELPHIA, PENNSYLVANIA.

**Ottawa Silica Co.'s Washed White Flint Sand**

Is used for sawing stone in more than a dozen states. Cuts more and lasts longer than any other sand on the market. Unexcelled for Roofing, Facing Cement Blocks, White Plaster, etc. Freight rates and prices on application.

**OTTAWA SILICA CO.,****Ottawa, Ill.**

## The Ironton Portland Cement Co.

Manufacturers of the  
Celebrated Limestone Brand of Portland Cement

Used by the Railroads in Kentucky, Ohio, West Virginia, and Virginia during the past five years. Cement as finely ground as any on the market. Guaranteed to pass all the standard specifications.

Plant located at Ironton, O., within easy access to seven States, namely, Ohio, Indiana, Kentucky, West Virginia, Virginia, Tennessee and North Carolina.

Shipments via the N. & W. Ry., C. & O. Ry., C. H. & D. Ry., D. T. & I. Ry., or Ohio River.

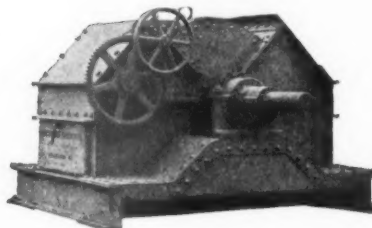
Write for Prices

**The Ironton Portland Cement Co.**  
Ironton, Ohio



## "PENNSYLVANIA" HAMMER CRUSHERS

For Pulverizing Limestone, Lime, Cement Rock, Marl, Shale, Etc.



Main Frame of steel, "Ball and Socket" Self aligning Bearings; forged Steel Shaft; Steel Wear Liners; Cage adjustable by hand wheel while Crusher is running. No other hammer Crusher has such a big Safety Factor.

**PENNSYLVANIA CRUSHER CO.**  
Philadelphia  
New York Pittsburgh



MILLS

Montreal	Port Colborne
Hull	Shallow Lake
Belleville	Marlbank
Lakefield	Winnipeg
Calgary	Exshaw

For Prices Any Where in  
CANADA

Write or Wire Our Nearest Sales Office

**Canada  
Cement Company  
LIMITED**

Montreal = Toronto  
Winnipeg = Calgary

ONE GRADE—ONE BRAND



## Alpha Portland Cement

Best in the World for  
Sidewalks

Write for our Handsomely Illustrated Book. Sent Free.

General Offices: No. 7 Center Square, EASTON, PA.

—SALES OFFICES:—

The Oliver Bldg., PITTSBURGH.  
Builders Exchange, BALTIMORE.  
Marquette Building, CHICAGO.  
Harrison Building, PHILADELPHIA.

Builders Exchange, BUFFALO.  
Board of Trade Bldg., BOSTON.  
Hudson Terminal Bldg., N. Y.  
Nat'l Bank Bldg., SAVANNAH, GA.



Quality,  
Quantity and  
Co-operation

Let our nation-wide co-operative advertising campaign focus the demand for cement into your warehouse. Let our eleven mills supply your need and let our quality insure you increasing demands for

**Lehigh Portland Cement**

Chicago, Ill.

Allentown, Pa.



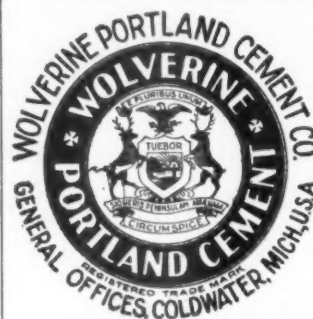
"THE BEST IS NONE TOO GOOD"  
**HIGHEST GRADE of  
Portland Cement**

Every Barrel Absolutely Uniform.

R. R. facilities especially adapted for prompt shipments in the northwest.

Capacity 1,500,000 bbls. Yearly.

**NORTHWESTERN STATES PORTLAND CEMENT COMPANY**  
MASON CITY, IOWA



**"WOLVERINE"**  
The Alright Cement

MADE RIGHT SOLD RIGHT  
WORKS RIGHT  
WEARS RIGHT

The Best is None Too Good For You.  
Insist Upon.

**"WOLVERINE"**

Write for Booklet and Quotations.  
Factories at Coldwater and Quincy, Mich.  
Capacity 3500 Daily.

**WOLVERINE PORTLAND CEMENT COMPANY**

W. E. COBEAN, Sales Agent,  
Coldwater, Michigan

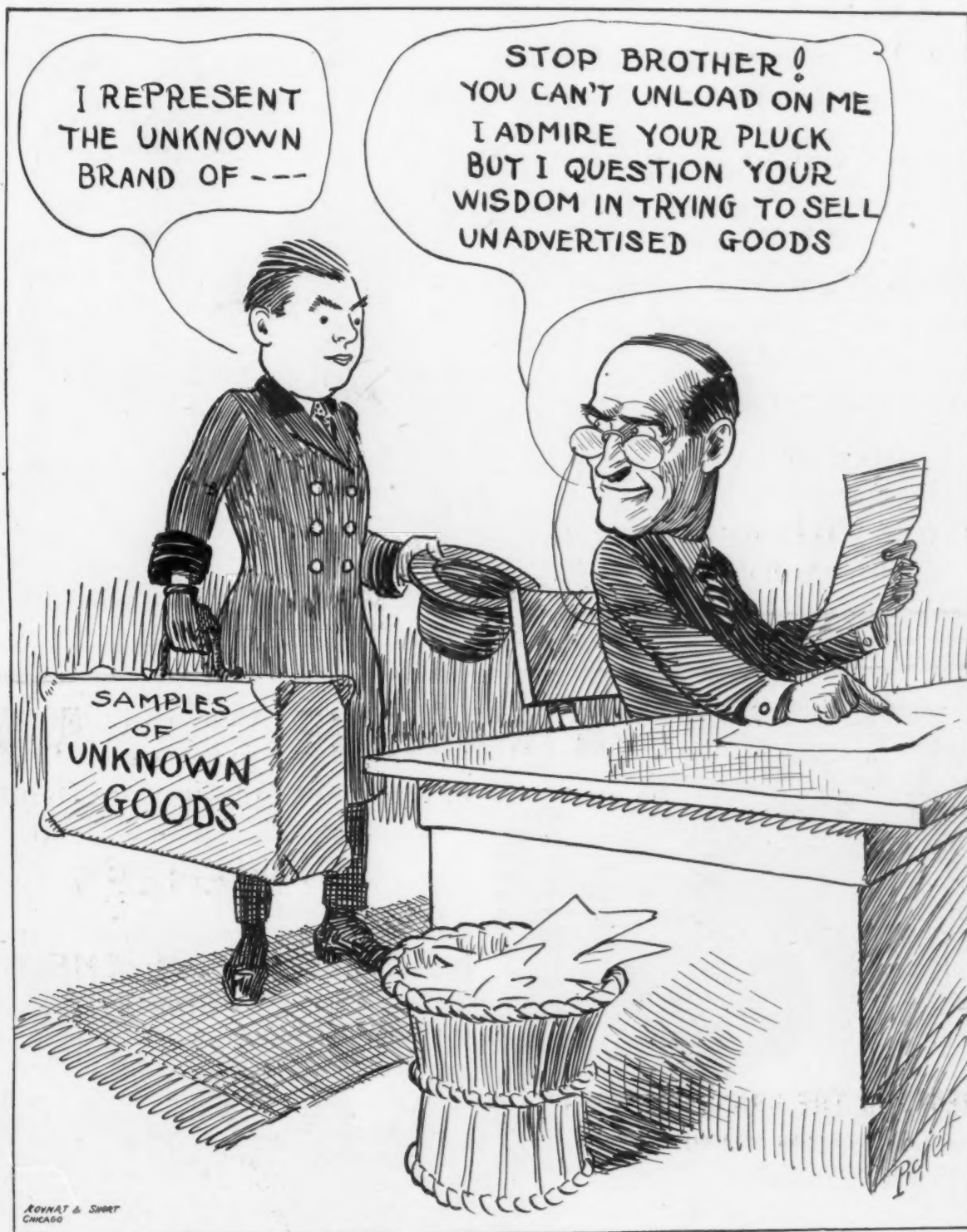
Main Office, Coldwater, Mich.

Tell 'em you saw it in ROCK PRODUCTS



S. H. BASSETT  
NEW YORK, N. Y.





## THE KNOWN AND THE UNKNOWN.

The Equipment and Goods in the Advertising Pages of Rock Products are all Known.  
Why? Because Everybody Interested Reads Rock Products.

# The Giant Griffin Mill

**TAKES** Clinker Kiln Size.  
**GIVES** A Finished Cement  
Ready to Sack.

## Capacity

Minimum, 12 bbls. Maximum, 17 bbls.  
Per Hour.

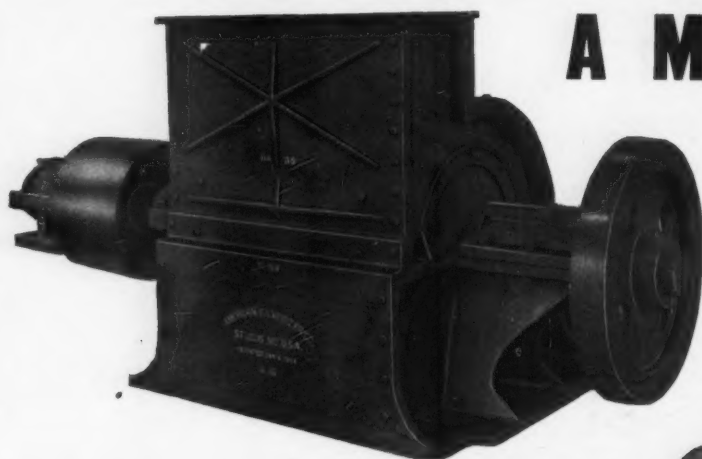
## Power

From 60 to 65 H. P. Operates Mill at Full  
Capacity

Upkeep under 1 Cent per bbl.

**THINK IT OVER**

**Bradley Pulverizer Co.**  
BOSTON, MASS.



**A MACHINE** that can **A TON**  
of limestone, granite, ore, sandstone,  
gravel, etc. to a given  
**FINENESS**

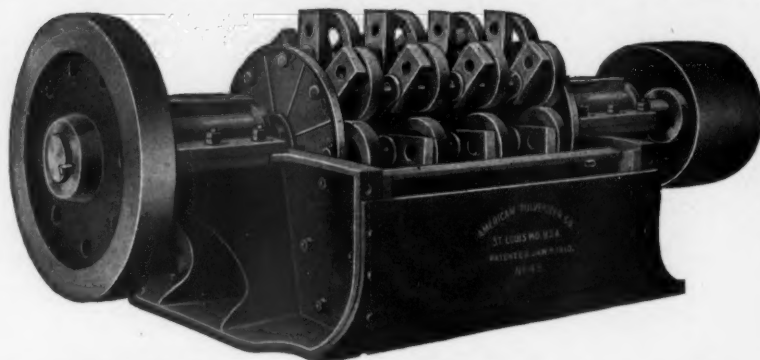
with the least cost of maintenance and  
power, admittedly **IS THE BEST.**

Not only **USERS**, but **COMPETITORS**, have told us our  
**RING PULVERIZER** is superior in hard material grinding

## PROOF RESTS IN THE HANDS OF USERS

who have operated our **RING PULVERIZER** grinding  
limestone for 18 months without a penny of main-  
tenance cost.

**BEST** because no other Machine can **COLLAR** the  
**JOB.** Buy the Machine that is guaran-  
teed and makes its guarantee good. Write for  
circular and particulars.



**AMERICAN PULVERIZER COMPANY,** 410 Jaccard Building **St. Louis, Mo.**

Tell 'em you saw it in ROCK PRODUCTS



## "Forgot to Oil It—"

The oft-repeated story of the man whose plant is out of order. Don't rely on memory, and you'll avoid expensive shut-downs. In the Symons Breaker, lubrication is automatic. The oil pump's memory never fails. Read the rest.

### There Is Only One Crusher with an Automatic Oiling System

*The Crusher's Life Blood is Oil*

Rock breakers work under most trying conditions, continually enveloped in a cloud of dust. It is very difficult, even with the "tightest fit," to exclude dirt from the running parts. The bearings are subject to immense pressures, very irregularly applied. When you add to these unfavorable conditions the further danger of careless supervision, any mechanic will admit the vital importance, to the practical quarryman, of the automatic oiling system peculiar to the

## Symons Crusher

The oil pressure excludes the dirt. Where oil cannot get out, dirt cannot get in. The steady flow of oil (volume variable to suit conditions) washes the bearings clean, smooth and cool, immerses the gears and then returns to the tank to be used again.

It's a winning combination—only two big bearings, carrying a greatly reduced working pressure, guarded from dirt and protected from wearing and heating by a continuous oil-flow, with the working load evenly distributed over the surface of the long eccentric. But that's not half the story which we would like to tell you. Write for our catalog No. 166.

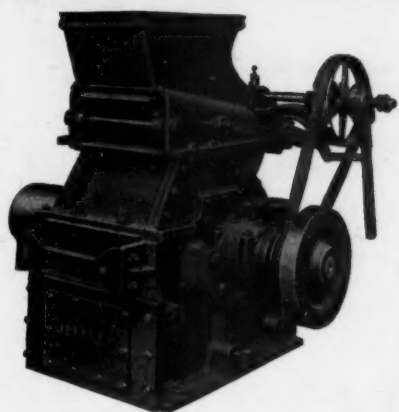
## The T. L. Smith Co.

1322 Majestic Building, MILWAUKEE, WIS.

Old Colony Building, CHICAGO, ILL.

Schofield Building, CLEVELAND, O.

## JEFFREY SWING HAMMER PULVERIZER



For Reducing  
**Limestone,  
Phosphate Rock,  
Shale, Slate,  
Fire Clay, Etc.**

Has a larger capacity, yields a more uniformly fine product, consumes less horse-power per ton of capacity, and costs less for upkeep than any other machine of its kind.

This pulverizer can be equipped with an Automatic Plate Feeder, which delivers the material at a uniform rate and distributes it to all the hammers so that none are overloaded and none are idle.

Complete information is given in our Catalog No. 31, "Jeffrey Pulverizers and Crushers."

*Write for Copy*

**Jeffrey Mfg. Company**  
Columbus, Ohio

New York  
Boston,  
Montreal

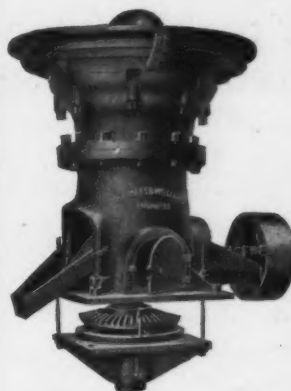
Pittsburg  
Charleston, W. Va.  
Atlanta, Ga.

Birmingham  
Chicago  
St. Louis

Denver  
Seattle

## You Can Buy a Gyratory Crusher For Less Than You Think

— just investigate the —



## BRONZE BALL GYRATORY CRUSHER

It has been experimented on, developed and perfected by us. It will reduce the cost of your crushed product, by reducing the amount of power consumed, by the low cost for repairs and by the increased capacity.

*You cannot afford to let this opportunity go by.*

**Chalmers & Williams**

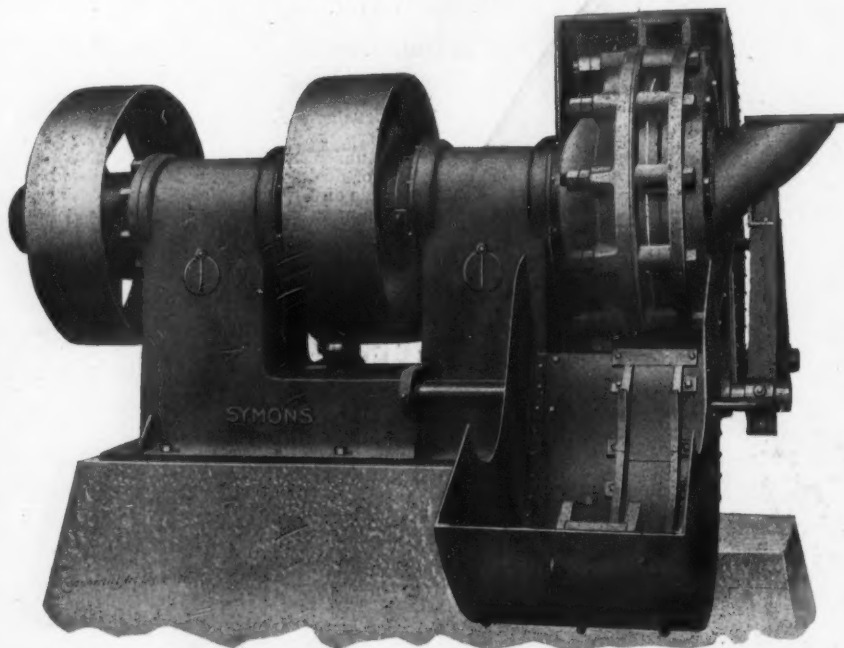
INCORPORATED

General Office and Works, Chicago Heights, Ill.  
New York Office, - - - Singer Building



Tell 'em you saw it in ROCK PRODUCTS

# Don't Rest or Sleep



Until you investigate the facts regarding the Symons Disc Crusher if you need a machine to follow a large breaker and reduce the rejections to small sized product.

## Exceptionally Strong and Durable

Remember a 48" Disc Crusher equals three No. 5 gyratories in the work of reducing 8" rejections to any size wanted between 2½" and ¾".

Ask for references to see this demonstrated. Inquire what other sizes are doing.

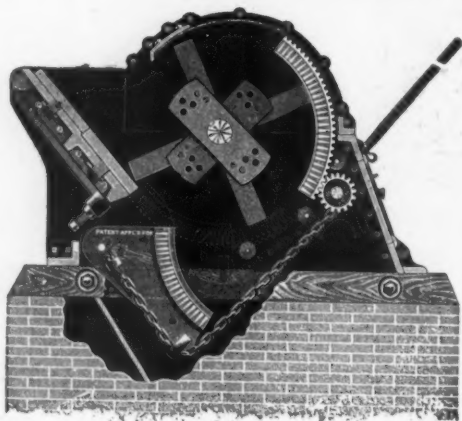
Address \_\_\_\_\_

**SYMONS BROTHERS COMPANY, Majestic Building Milwaukee, Wis.**

# WILLIAMS JUMBO CRUSHER

**Will take 12 to 14 in. cubes Limestone or Shale and reduce to 2 inch,—1½ inch,—1 inch,—¾ inch and finer. 1 No. 6 Recently Replaced 3 No. 5 Gyratories.**

"MANUFACTURED AND LICENSED UNDER 87 SEPARATE AND DISTINCT PATENTS."



WITH DUMP CAGE OPEN.

**WORKS: 2701 N. Broadway, ST. LOUIS  
SAN FRANCISCO, 347 Monadnock Bldg.**

Iola, Kansas, December 6th, 1910  
Williams Patent Crusher & Pulverizer Co., St. Louis, Mo.  
Gentlemen: Your No. 6 Jumbo Crusher recently installed by us is handling about 100 tons per hour of crushed limestone from a No. 5 Gyratory Crusher, the largest pieces of which will average six inch cubes.  
The capacity of our elevator is 115 tons per hour and the machine easily overloads the elevator. We are now installing an elevator of double the CAPACITY FOR THIS CRUSHER. Your guarantee was fifty tons per hour from this machine.  
Your crusher reduces all of our material to three-quarter inches and finer, and the majority to one-quarter inch.  
We have been operating the machine about eight weeks and find same most satisfactory.  
Yours very truly, THE IOLA PORTLAND CEMENT CO., F. L. WOODS, Supt.

## MADE IN 8 SIZES—ALL PARTS ADJUSTABLE

Ask Iola Portland Cement Co., Texas Portland Cement Co., Southwestern Portland Cement Company,—or us. Write for Bulletin 12.

## WE ALSO MAKE LIMESTONE GRINDERS

# THE WILLIAMS PATENT CRUSHER & PULVERIZER COMPANY

**OLD COLONY BL'DG.——CHICAGO**

Tell 'em you saw it in ROCK PRODUCTS

# Knickerbocker Portland Cement

Semi-Wet Process

Lightest (gray) Color of all Portland Cements, Manufactured in a Model Plant by Modern Methods, Shipped by Rail or Water—  
Quick Deliveries

HIGHEST



QUALITY

Users of "Knickerbocker" Say it is Uniform, Finely Ground, and Works Most Satisfactorily

## Join the "Knickerbocker Family"

*Permit Us To Ship You Now*

## Knickerbocker Portland Cement Company

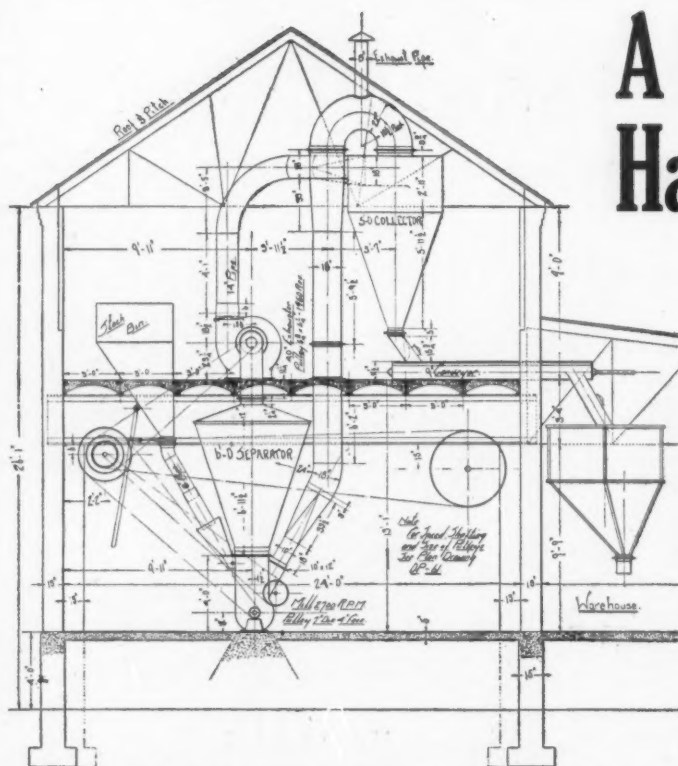
WORKS: Hudson, N. Y.

GENERAL SALES OFFICE: One Madison Avenue  
New York City

WORKS: HUDSON N.Y.

KNICKERBOCKER

Tell 'em you saw it in ROCK PRODUCTS



TYPICAL RAYMOND PULVERIZER INSTALLATION

## A Grinding Record Which Has Never Been Equaled

**T**WO Raymond 5 Roller Mills were installed some years ago in a large Cement Plant. They replaced 6 mills of another make. They saved 12% in coal due to the greater fineness. The 2 Raymond Mills did as much work in one 12-hour shift as the 6 mills did in two 12-hour shifts.

They saved 1-2 the cost of operation. They saved 66 2-3% in labor expense, 2 men as against 6 men.

They saved 1-2 the cost of power, and the grinding room was kept free from dust at all times, whereas previously men could not be kept at work owing to the choking atmosphere. The

## RAYMOND PULVERIZING AIR SEPARATING SYSTEM

does the most uniform perfect pulverizing of any known mill or method. It grinds a finer product and separates it as fast as ground without clogging or cushioned rolls. No bolters, reels or screens are used, hence no costly repairs, replacements or shut-downs. There is no waste and no tailings to be reground. The material is taken from the mill by the air suction and is carried to any point desired in the plant.

Send for our Book No. "00", which explains in detail what our system is and how and where it may be used.

Read this book and you may find the way to divert some items from the expense account into the dividend account.

We design special machinery and methods for Pulverizing, Grinding, Separating and Conveying all powdered products. We manufacture Automatic Pulverizers, Roller Mills, Vacuum Air Separators, Crushers, Special Exhaust Fans and Dust Collectors.

**RAYMOND BROTHERS IMPACT PULVERIZER CO.**

517 Laflin Street, CHICAGO, ILL.

Designers of Special Machinery and Methods for Grinding, Pulverizing and Separating. Manufacturers of Automatic Pulverizers, Roller Mills, Vacuum Air and Screen Separators, Crushers, Special Exhaust Fans, Dust Collectors.

**CUT OUT THIS REMINDER**  
To write to Raymond Bros. Impact Pulverizer Company, 517 Laflin Street, Chicago, Ill. Ask for Book No. 00, explaining our modern money-saving method of Pulverizing and Air Separation. (20)

Tell 'em you saw it in ROCK PRODUCTS

## The cost of breaker repairs should be taken into consideration



With Gates Breakers the cost of repairs varies only with the character of the rock crushed and not with the age of the machine.

A Gates Breaker sold in 1887, and still in use by the original purchaser, has had no repairs requiring new parts in the past two years.

The low cost of repairs for Gates Breakers has been a very important factor in securing repeat orders and swelling the total sales to over 7,000. Once a user always a user is the record of Gates Breakers and results from the satisfaction which these machines give.

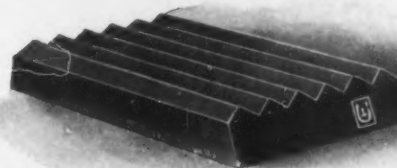
*"The Maker Stands Behind It"*

**Allis-Chalmers Company**  
Milwaukee, Wisconsin



**TISCO**  
MANGANESE STEEL  
**CHAIN**

Supplement to Bulletin 113 Gives Reduced Prices.  
Taylor Iron and Steel Co., High Bridge, N.J.



**TITAN MANGANESE STEEL**

Unequaled for wearing parts of Jaw Crushers, Gyratory Crushers, Cement Machinery, Coal Breaking Machinery, Steam Shovels and Dredges. Send us your inquiries.

**TITAN STEEL CASTING CO.**  
NEWARK, NEW JERSEY

CHICAGO  
RICHMOND

SAN FRANCISCO  
BOSTON

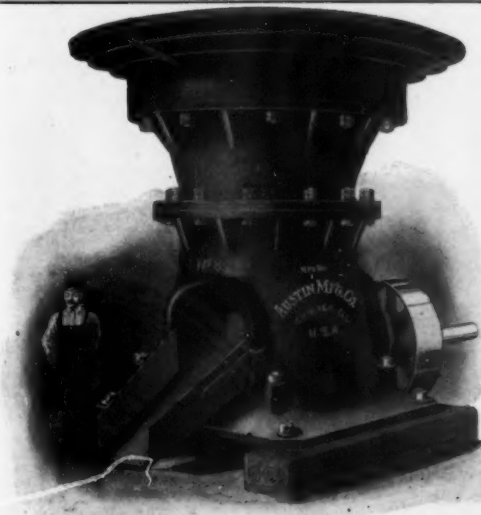
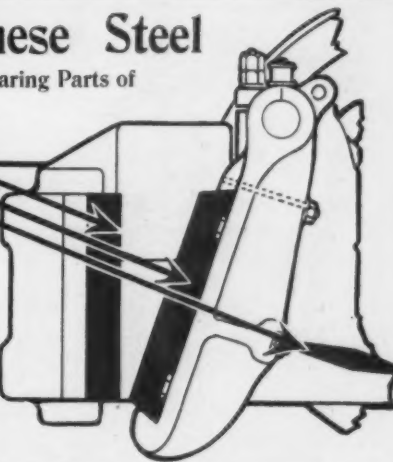
**True Manganese Steel Castings** for All Wearing Parts of Crushers.

ALSO

Open Hearth Steel Castings and Alloys: Vanadium, Nickel, Etc.

**AMERICAN Steel Foundries**

New York Chicago Pittsburgh St. Louis  
Monadnock Building, San Francisco



## AUSTIN GYRATORY CRUSHER

The World's leading rock and ore breaker.

The only self lubricating Crusher.

The only Crusher having double countershaft bearing.

Simple construction, correct design.

Thousands in use.

Plans and specifications furnished for any sized plant.

Send for Catalogue No. 17.

All experienced users recognize that the efficiency and durability of the suspension bearing as applied to Gyratory Crushers, depends upon locating the bearing at the point of least gyration or movement of the main shaft.

A perfect suspension can be made only by locating the bearing at the point where there is no movement of the shaft. That being a mechanical impossibility it follows that superiority is obtained in fixing the bearing at the point of least gyration of the shaft.

As the accompanying cut will show, the movement of the shaft at the point of suspension in the Austin Crusher is reduced to the minimum and practically eliminated. Consequently the highest possible degree of efficiency and durability is obtained.

**Austin Manufacturing Co., Chicago**

Mussens Ltd., Montreal, Can., Canadian Sales Agents.



New York City Office  
1682 FULTON BUILDING  
Hudson Terminal

Tell 'em you saw it in ROCK PRODUCTS



# MAXECON

## Means MAXimum of ECONomy

Years of experience with the assistance of our hundreds of customers has found THE SOLUTION OF GRINDING HARD MATERIALS. The MAXECON PULVERIZER combines highest EFFICIENCY, greatest DURABILITY and assured RELIABILITY. Uses the LEAST HORSE POWER per capacity. Embodies the features of our Kent Mill with improvements that make it MAXECON.

**WE DO NOT CLAIM ALL of the CREDIT for this achievement**

We have enjoyed the valuable suggestions of the engineers of the Universal Portland Cement Co. (U. S. Steel Corp.), Sandusky P. C. Co., Chicago Portland C. Co., Marquette Cement Mfg. Co., Western P. C. Co., Cowham Engineering Co., Ironton P. C. Co., Alpena P. C. Co. Castalia P. C. Co., Pennsylvania P. C. Co., and many other patrons.

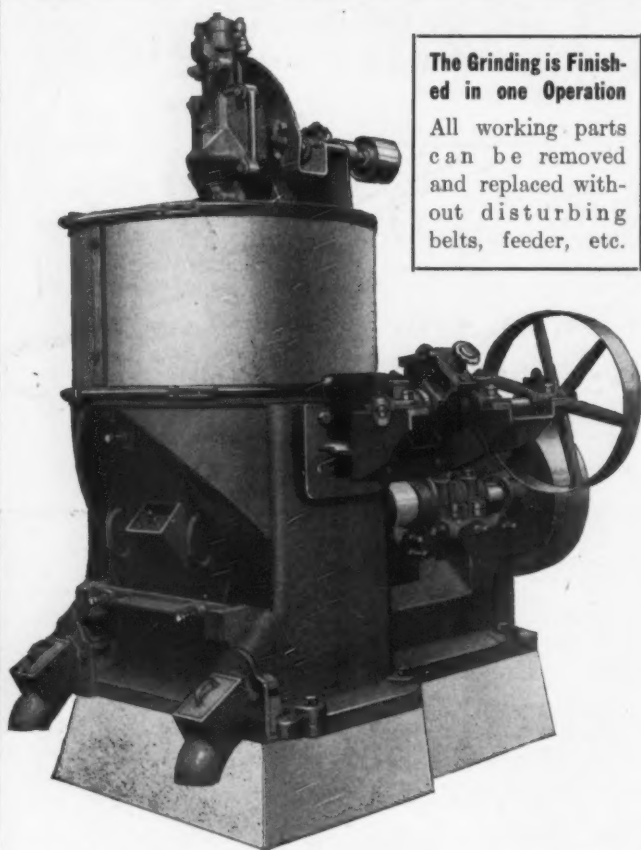
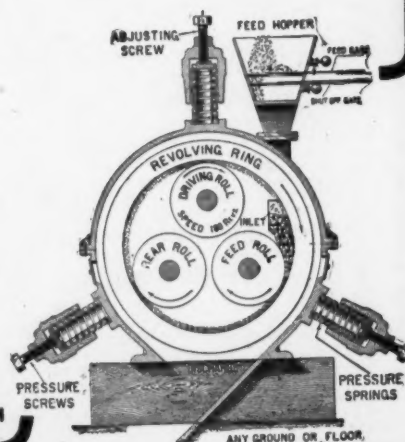
## THE RING WOBBLER

The FREE WOBBLING POUNDING RING instantly and automatically ADAPTS its position to the variations of work.

Its GRINDING ACTION is DIFFERENT than any other; besides the STRAIGHT rolling action of the rolls, the SIDE to SIDE motion of the ring makes the material subject to TWO crushing forces and DOUBLE OUTPUT results.

## KENT MILL CO.

10 RAPELYEA ST., BOROUGH OF BROOKLYN, N. Y. CITY  
LONDON, W. C., 31 HIGH HOLBORN  
CHARLOTTENBURG 5, WINDSCHEID STRASSE 31, BERLIN



The Grinding is Finished in one Operation

All working parts can be removed and replaced without disturbing belts, feeder, etc.

## BONNOT PULVERIZER

**Grinds and Screens Limestone, Raw Lime and Hydrated Lime**

**Does it at One Operation. Gives You Any Desired Fineness**

GRINDING LIME IS LARGELY A SCREENING PROPOSITION. THE BONNOT PULVERIZER HAS THE LARGEST SCREENING SURFACE AND CONSEQUENTLY THE GREATEST CAPACITY.

NO OTHER MACHINE LIKE IT IN THE ACCESSIBILITY OF SCREEN AND GRINDING PARTS.

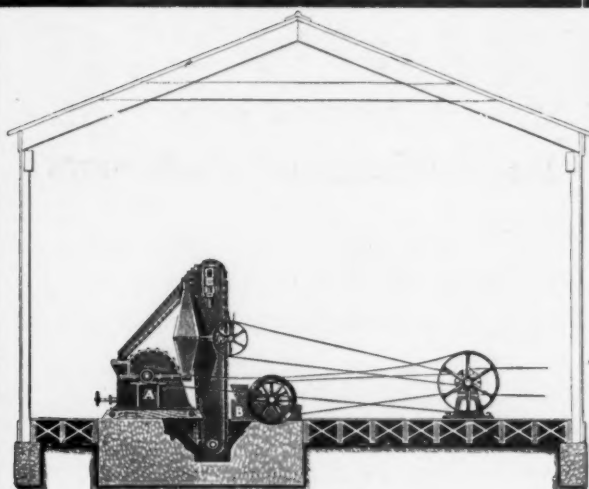
No. 4 Catalog Explains These Advantages

## THE BONNOT COMPANY

909 N. Y. Life Bldg.  
KANSAS CITY, MO.

**CANTON, OHIO**

Tell 'em you saw it in ROCK PRODUCTS



Stationary Plant

## Get Into the Game

**GRIND YOUR LIMESTONE SCREENINGS  
AND MAKE LIMESTONE FERTILIZER**

What Is Now a Dead Loss to Some Quarrymen  
Can Be Turned Into Good Profits

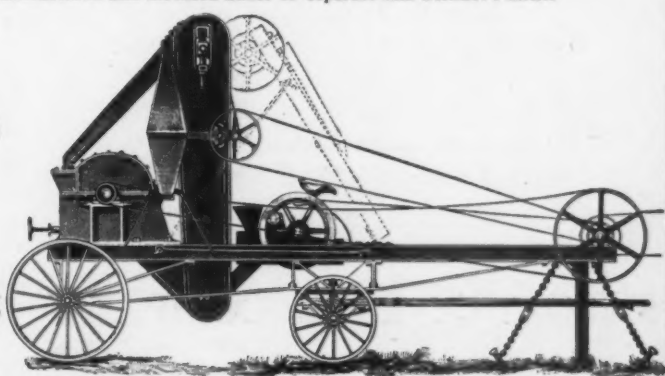
WE FURNISH COMPLETE PLANTS OF ANY CAPACITY DESIRED  
Manufactured and Licensed under 87 Separate and Distinct Patents

We now have over 30 plants in operation

BULLETIN NO. 4 EXPLAINS THE  
PROPOSITION

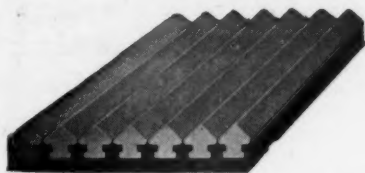
**The Williams Pat. Crusher &  
Pulv. Co.**

ST. LOUI 2705 N. Broadway  
CHICAGO: Old Colony Bldg.  
SAN FRANCISCO: 428 Monadnock Bldg.



Portable Plant

### A Tempered Steel Jaw Plate for Blake Type Crushers



Canda Tempered Steel Crusher Jaw Plate

Patented March 31, 1908

The Canda Tempered Steel Jaw Plate for Blake Crushers is composed of Forged and Rolled Chrome Steel Bars, cast-welded and also mechanically interlocked into a backing of tough steel—and the wearing face is tempered to extreme hardness. We are equipped to supply both corrugated and smooth face plates for all sizes and makes of Blake Crushers.

The Canda method of cast-welding forged and tempered steel bars into a mild and tough Steel Backing, is adapted also to the construction of Cone Heads for Gyratory Crushers, Segments for Corrugated Rolls, etc., etc.

Our products in this line are sold with our special guarantee that they will wear longer, give better satisfaction and, at our price, prove more economical than any others now on the market.

— Send for Descriptive Pamphlet —

Represented by

J. F. Spellman, 202 Century Building, Denver, Colo.

George T. Bond, Easton, Pa.

George W. Myers, San Francisco, Cal.

### CHROME STEEL WORKS

CHROME, N.J., U.S.A.  
FORMERLY OF BROOKLYN, N.Y.

## FARREL ORE AND ROCK CRUSHER

USED IN ALL PARTS OF THE WORLD—LARGE  
RECEIVING CAPACITY—SPECIALLY DESIGNED  
AND CONSTRUCTED FOR HARDEST KIND OF WORK  
COMPLETE CRUSHING PLANTS OUR SPECIALTY

• SEND FOR CATALOGUE •

**EARLE C. BACON, ENGINEER.**

FARREL FOUNDRY & MACHINE CO. HAVEMEYER BUILDING, NEW YORK

### GEARS

Nearly all manufacturers of  
cement mill machinery use  
Nuttall Gears



The Nuttall Company has made a number of tests of cement mill installations, its engineers have a thorough knowledge of the operating conditions and will specify gears cut from material of the proper chemical constituents to assure Reliability and Low Maintenance Cost.

**Nuttall—Pittsburgh**

When in a hurry, wire us.

Tell 'em you saw it in ROCK PRODUCTS

## Get the Full Efficiency From Your Lime

Stone in the slaking box after the mortar is drawn off indicates that the lime used was not thoroughly burned. Consequently the full efficiency of the lime is not obtained.

### No Waste to MITCHELL LIME

It is made from selected rock free from dirt. It is carefully burned. All the lime is forked to insure thoroughly burned pieces. There can be no cores by our method. Every particle slakes. It carries more sand, spreads farther and lays more brick.

### MITCHELL LIME COMPANY

WORKS:  
Mitchell, Ind.

528 Peoples Gas Bldg.  
Chicago, Illinois



The  
National  
Lime &  
Stone Co.  
CAREY, OHIO

## Waste Means Loss of Money

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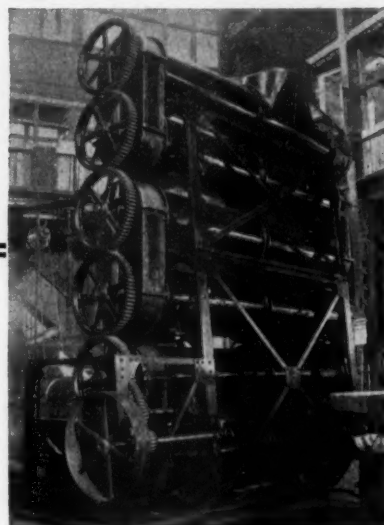
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Bulletin No. 43

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Every concrete worker can do Better Work.  
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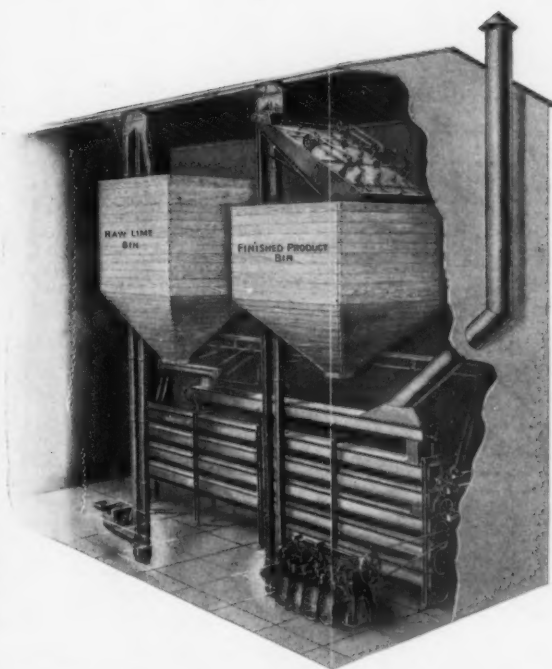
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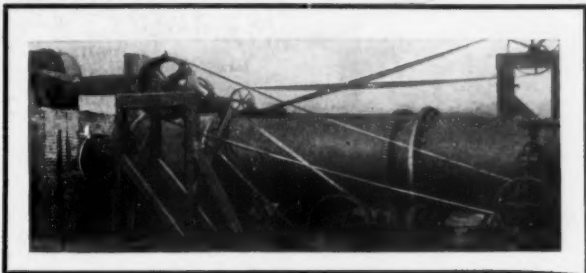
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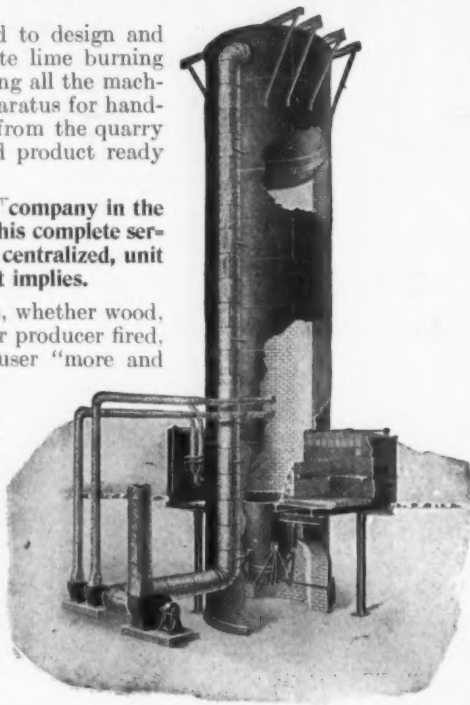
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# ROCK PRODUCTS

ESTABLISHED IN LOUISVILLE, KY., 1902.

DEVOTED TO CONCRETE AND MANUFACTURED BUILDING MATERIALS.

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CHICAGO, MAY 22, 1912.

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## THE FRANCIS PUBLISHING COMPANY

EDGAR H. DEFEBAGH, Prest.

Seventh Floor, Ellsworth Bldg., 537 South Dearborn St., Chicago, Ill., U. S. A.  
Telephone Harrison 8086, 8087 and 8088.

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FRED K. IRVINE.

MANAGING EDITOR.

CHARLES D. WARNER.

BURDIS ANDERSON, Manager.

Communications on subjects of interest to any branch of the industry are solicited and will be paid for if available.

Every reader is invited to make the office of Rock Products his headquarters while in Chicago. Editorial and advertising copy should reach this office at least five days preceding publication date.

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In the United States and Possessions and Mexico.....\$1.00  
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Entered as second-class matter July 2, 1907, at the Postoffice at Chicago, Illinois, under Act of March 3, 1879.

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## Concrete Roads

For some time ROCK PRODUCTS, in its position in the watch tower of the cement industry, has seen the trend of public opinion in favor of concrete roads. Today we are impressed more than ever with the fact that the concrete road is to solve and has solved the problem that confronts all the organizations that are devoting themselves to the betterment of roadways throughout the United States.

In this number we publish the most remarkable story that ever has been seen in print on this subject. It is the story, not of what may be done, but the story of what has been done.

The Association of American Portland Cement Manufacturers, whose members are alive to conditions affecting public improvements, held an open session for the discussion of concrete roadways at its recent meeting in Chicago. Naturally such a discussion should be held by friends of cement and the manufacturers of it. The men directly interested are the first always to learn of the successes met with anywhere by the use of their material.

In this instance, however, while the cement manufacturers have known for some time what could be done with Portland cement in street paving and road making, the session was reinforced by the opinions of outside experts who have pursued their own methods, made their own investigations and drawn their conclusions absolutely independent of any influence from the ranks of cement men. This fact is what makes the verdict in favor of concrete pavements, one without any suspicion of commercialism or effort to sell cement inadvisedly for road making. The tour of inspection made by a large party to Ann Arbor and Detroit, where concrete roads have been in use for some time, merely confirmed the impressions and strengthened the convictions gained at the meeting.

ROCK PRODUCTS has been, and is the first trade publication to espouse the cause of concrete roads. We believe concrete roads are the best because they are permanent, require practically no maintenance cost, will always be clean, will remain for this generation and many to come when properly made as those in Wayne County and Ann Arbor have been, will increase the value of abutting land, will make the cost of living lower by giving the farmer easier access to the markets, and will add materially to the comforts of modern life.

The farmer who votes in favor of bond issues for the building of concrete roads is voting something not only for himself but for his children and his grandchildren. He is voting for the increased value of his farm and the increased taxes amount simply to an increase in his land value.

These considerations are the factors influencing the cement manufacturers and not the mere merchandising of more cement, and in that stand ROCK PRODUCTS joins unreservedly and heartily. This subject is to be viewed from the broad platform of public policy and not from any mere commercial standpoint. This publication and the interests it represents would be unworthy of its profession and unworthy of the men it speaks for if it viewed the matter in any other light. We shall regularly present the new developments along this line, solely for the education of our readers, and to that end we invite the co-operation of all our friends who believe not only in indestructible buildings, but indestructible roads over which the products of the farm are to be drawn. Climb into the concrete road wagon.

The man who is busy has no time for pessimism or fault finding. Hope you are busy.

The clay brick interests report a general revival of trade, due to the opening of the building season, and there is no reason why this should not be a banner year in this line.

The crushed stone people are now reaping the harvest they have been waiting for during all those long, cold, chilly months, and the season promises to be a most successful one.

The sand and gravel interests are working overtime. This industry, which has grown up along with the cement industry, is increasing at a most remarkable rate and producers everywhere report a heavy demand.

We publish in this number statistics of the sand-lime brick industry for the year 1911. You will note from the figures a decrease in this very interesting branch of the building material industry. It ought to show an increase. Every sand-lime brick residence is a standing advertisement of this beautiful brick and it is expected that this year will show an increase.

Indications from the various hard wall plaster mills are for a good season. The developments and the new forms characteristic of this material are surprising. The retailer who pushes the sale of hard wall plaster and its various specialized forms is bound to reap a harvest, so when the salesman from any of these mills calls on you it will pay you to listen to what he has to say.

Did it ever occur to you that the advertisements in your trade publication are fully as interesting as the editorial matter? By reading the advertisements you keep informed of the new things in your line, because the live advertiser, encouraged by us, is frequently changing his advertisement and telling in simple language the story of the new thing he has that will interest you. The advertisements in this publication are the pulse of your industry. Of course, we want you to read the editorial matter, but do not overlook the advertising pages.

You probably have noticed that the lime department of ROCK PRODUCTS is devoted to matters relating to the many uses of this very useful and ancient material. We publish all these things for a purpose and that purpose is to give the retailer an increased knowledge of lime and its many uses, so that he may have more selling points to talk to his trade. The live retailer who will go along with us in these discussions and absorb the facts presented each month is equipped to handle any proposition that may come before him involving the use of lime. There is no material he handles that has more uses and it will pay the retailer to keep informed on this subject.



# CONCRETE ROADS

Discussion By Experts Before The  
ASSN. OF AM. PORT. CEMENT MANUFACTURERS



I am convinced that the future of Portland cement as a road material is as bright as that of any other known material.—LOGAN WALLER PAGE, Director of Public Roads, Agricultural Department, Washington, D. C.

Concrete roads, including roads with a concrete foundation, with a brick wearing surface or concrete roads with a surface of bitumen, are the best roads that can be built.

This is the verdict of road experts who attended the meeting of the Association of American Portland Cement Manufacturers, the week of May 6-11, at the La Salle Hotel in Chicago. The association did something at this session which marked it as the most important in the history of the cement industry. It held an open session on the 9th of May, when the subject of concrete roads was discussed from every possible point of view, by such men as L. W. Page, Director of Roads, Washington, D. C.; E. N. Hines, Road Commissioner of Wayne County, Michigan; Will P. Blair, Secretary of the National Paving Brick Manufacturers' Association; J. C. McCullough, City Engineer of Fond du Lac, Wisconsin, and others.

Mr. Page spoke from his experience with concrete roads in Washington and other sections where he has made experiments. He is unqualified in his endorsement of the concrete road as the best that can be built. Mr. Hines described the method pursued in the building of the extensive system of concrete roads in Wayne County, Michigan, around and in Detroit, and likewise, Mr. McCullough and Mr. Blair spoke from actual experience.

In fact, this entire discussion was based, not on what it is best to do—it was not academic in any sense of the word as such discussions usually are—it was based on what actually has been done.

In further proof of what these gentlemen had to say, the cement manufacturers, to the number of sixty or more, were conducted on an excursion to Ann Arbor and Detroit, where they saw for themselves what has been done with their material.

Rock Products desires to say on behalf of the cement men, and for the benefit of road commissioners and county supervisors throughout the United States, that the cement manufacturers are not promoting the use of their material in road building from purely commercial motives, but because this material presents the best that can be used in such construction. They are actuated as much by patriotic motives as they are by the desire of selling cement. Be that as it may, when such men as those who have been named endorse this method of road construction, it ought to be taken for their honest opinion, unbiased by any other motive than that of securing the best possible pavement.

Mr. Page, we have reason to know, is working for the best road that can be built. It just happens that this road is one of concrete. If any other material were the successful candidate, he would as readily endorse that as he has endorsed concrete, and likewise with the others. All those who are seeking the truth about these matters, who have in

view the betterment of the roads throughout our country, are urged to read the papers herewith presented and judge for themselves.

The sessions of the association, it may be said in passing, were characterized by a degree of good feeling and enthusiasm that is not always present in this dignified body. A feeling of optimism pervaded the assemblage and the men from every section seemed confident for the future. The center of interest, however, was about the open session of Thursday, when the subject of concrete pavements was discussed.

## President Hagar's Opening Address.

President Hagar said, in opening the session: "This open meeting of the Association is in relation to the use of concrete in road construction and we have speakers and representatives of this type of construction, as well as engineers and the Director of the Office of Public Roads. I might state that the attitude of this Association is friendly toward any pavement in the construction of which cement is used, and we must adopt an impartial attitude toward the pavements that use



L. W. PAGE, DIRECTOR OFFICE OF PUBLIC ROADS, WASHINGTON

cement in their construction; but we have no use for a pavement that does not use cement.

"Any speaker today has perfect liberty to say anything he cares to say in support of his material, whether he hurts another's feelings or not. Everybody has the same privilege and there is no restriction whatever on the statements, and there is no restriction on the number of questions we may ask the speakers."

L. W. PAGE, DIRECTOR OF THE OFFICE OF PUBLIC ROADS, WASHINGTON, D. C.

The first speaker of the day was L. W. Page, Director of the Office of Public Roads, Washington, D. C., and a representative of the United States Government. He said:

For some years, the best practice in city street construction has called for Portland cement concrete foundations. Used for this purpose, concrete has proved more satisfactory than any other material, and no improvement could reasonably be expected.

During the past ten years probably more experiments with road materials have been made than in any other period in the world's history. The new traffic conditions brought about by the automobile have almost completely upset our standards for rural and suburban roads. During this time much experimenting has been done, with the object of making concrete available as a road material. Up to the last four or five years, however, I think it can be safely said that concrete as a road surfacing material has in most cases not yet been proven to be altogether satisfactory. While this is true in general, yet there are isolated instances where concrete has been used for road construction with such a degree of success, that complete success seems to be almost in sight. This fact alone, it seems to me, justifies an assumption that concrete can be made generally successful as a road material, provided sufficient care is used in the selection of materials, their mixing, laying and curing, all of which necessitates skilled supervision.

Probably no form of construction requires greater homogeneity than that of a road surface, as no other structure is subjected to more severe chemical and physical wear. A successful road must wear uniformly and smoothly.

Right here, gentlemen, I would like to say that I think we have a good deal to learn in regard to proportioning the aggregates in concrete road surfaces. Now you know we want the densest possible aggregate, standing the very rough usage to which a road is subjected, and I intend to make some experiments this summer in getting the densest practicable aggregate. We also have a great deal to learn in regard to the best kind of rock to be used. I think in that regard we can safely follow our experiments in macadam construction. The type of road coated with cement is undoubtedly the best variety of trap rock and would give the best results. I am going to make experiments this summer to see for myself what is the best to use.

From the best information obtainable, it appears that great variation has existed in the construction of Portland cement concrete pavements up to the present time. Pavements have been laid, in many cases, in two courses, and, in a considerable number of places, in but one course. A great variety of proportions have been used for the foundation course and for the wearing surface where two courses have been used, and almost as many variations in proportions where a single course has been laid. In the absence of definite, published information as to the behavior of these different mixes laid either in one or two courses, it is yet too early to attempt to predict what will ultimately be found to be the best and most economical method of constructing these pavements. Portland cement concrete has been used so successfully in nearly all forms of construction that it seems reasonable to expect that we can not go far wrong in making concrete for a pavement if we adopt the best standard practice in use today for other types of construction.

First, we should select only Portland cement which will conform in every respect to the standard specifications for that material adopted by the American Society for Testing Materials, and all cement should be tested before it is used in the work.

Second, sand should be clean, sharp, coarse and well graded, and may contain not to exceed 5 per cent of loam or clay, provided organic matter is not present.

Third, the coarse aggregate should be composed of clean, hard, sound rock; of gravel of a good quality; or of hard, dense, crushed blast-furnace slag. The coarse aggregate should be broken or screened so as to be retained on a 1/4-inch mesh and pass in any direction through a 1 1/4-inch mesh. Clean water free from strong acids and alkalis, of course, should be used in making the concrete.

A sufficient amount of cement should be used to a little more than fill the voids in the sand, and a sufficient amount of mortar should be used to a little more than fill the voids in the coarse aggregate. The mixing, of course, can be either done by hand or by machine. If by machine—which would be preferable on large jobs—I would recommend a batch mixer, in order to adhere strictly to the correct proportioning of the materials.

No definite rule can be laid down for proportioning materials, but, as a general proposition, probably a 1-2-4 or a 1-3-5 mix will in most cases give satisfactory results. It is evident that a great field for careful experimentation is open right here, upon the results of which will largely depend the economical construction of future concrete pavements.

Assuming that our foundation is as carefully prepared, and as thoroughly drained and compacted as would be necessary for any form of pavement, the concrete must be carefully placed, spread, and compacted by tamping to a uniform thickness of six or more inches—the thickness depending upon the character of the foundation and the character of the traffic to which the pavement is to be subjected.

I believe one reason why many concrete pavements have failed in the past is because the concrete has been improperly cured before traffic has been allowed upon it. We know that concrete cured under water attains a greater ultimate strength than that cured in air. For this reason, I would recommend a fairly wet mix and for a period of from one to two weeks after the concrete has been laid that the surface be kept thoroughly moistened by sprinkling. If provision can be made for keeping the sun from coming directly on the surface, this should prove very beneficial. This protection can be accomplished by covering the surface of the concrete with loam or other soil of which the shoulders of the road is composed. True, such protection will add to the expense of the pavement, but I believe the additional

cost will be more than offset by the increased strength of the concrete. In the case of city pavements, this protection might be accomplished by covering the surface with straw, sawdust or shavings. It occurs to me that further opportunity for the concrete to gain additional strength would be provided at slight expense if, after the curing just mentioned has been completed and the loam or soil has been removed and the surface allowed to dry, a thin coat of bituminous material and sand should be immediately applied. This form of construction has been used, I am told, at Ann Arbor, Mich., for the past three seasons. It seems to me that it would materially lessen the shocks from traffic, and if only one bituminous coat were applied and allowed to wear off, it would be worth the additional cost as a protection to the new concrete.

In experiments the office of public roads has been making for the past two and a half years, we found a good many of the failures from cracks have occurred from letting the concrete dry too quickly. On fifty-inch pavements made on conical steel bearings, we found on eight-inch columns, from the time of the initial setting until the final setting, it would stand nearly 200 pounds to the square inch; after ninety days dry nearly 1,000 pounds to the square inch. I think that what takes place on letting concrete dry too quickly, you get the final setting before the rough coat is taken up.

Experiments indicate that concrete upon drying out exhibits shrinkage, and, at the end of six months, the shrinkage amounts in fairly dry concrete to  $\frac{1}{4}$  of an inch to the 100 feet. This is as much contraction as would be caused by a change in temperature of over 100 degrees F., showing that the effect of moisture in causing the cracking of concrete is certainly as great as, if not in excess of, that due to change in temperature. If means could be provided for preventing the drying out of the moisture, much of this shrinkage would be prevented. The consequence would be a more solid mass of concrete.

The bituminous top just described would prevent the rapid drying out of the concrete mass, and, therefore, prevent the formation of many of the cracks which would otherwise occur. Provided cracks did occur, the bituminous covering would be immediately driven into these cracks by traffic, and the cushioning effect of the bituminous top would prevent chipping and spalling of the concrete at these cracks.

Undoubtedly, provision must be made for expansion and contraction. While unable to state exactly what this allowance should be, the best practice up to the present time seems to call for an expansion joint  $\frac{1}{4}$  of an inch to  $\frac{1}{2}$  of an inch along each side of the pavement at the curbing in the case of streets, and a transverse expansion joint about every 25 feet. Experience may show us, however, that these transverse joints can be placed further apart.

My examination of concrete pavements so far laid has indicated that a transverse joint of a half inch filled with suitable paving pitch makes a satisfactory joint, and prevents chipping at the edges of the concrete.

On account of the dense surface, a crown of  $\frac{1}{4}$ -inch to the foot is probably sufficient for concrete pavements. Such a flat crown is very desirable on any pavement, on account of its tendency to distribute the traffic over the entire width of the pavement. By the use of different floats, almost any kind of a surface finish can be obtained. For ordinary traffic, of course, too smooth a surface is not desirable, on account of its tendency towards slipperiness.

One feature of Portland cement concrete pavements that looks particularly attractive is the probable absence of excessive maintenance charges. I have reports from the city engineer of Portland, Maine, of seventeen sections of concrete pavement built by the Hassam method, the oldest of these pavements having been laid in 1907. Several sections have been laid each year since. The reports indicate that there has been no maintenance expense on any one of these sections. Portland is a city of about 55,000 inhabitants, and many of these concrete sections are subjected to excessive traffic on streets with double car tracks. Several other instances have been brought to my notice where substantially no maintenance charge has obtained on concrete pavements from three to five years old, and where the wear is practically nil.

Figures collected by the office of public roads relative to the cost of maintenance of plain macadam and bituminous macadam pavements under fairly heavy traffic conditions indicate that these pavements, when properly maintained, entail an annual absolute maintenance charge of approximately \$450 per mile per annum for plain macadam, and possibly from \$800 to \$1,000 per mile per annum for bituminous macadam, for 15-foot surfaces. These figures have led me to believe that we must seek a more permanent form of pavements for country road surfaces. It may be that the concrete road will meet this requirement.

In the matter of sustaining normal loads the capacity of concrete pavements as compared with the capacity of ordinary macadam or bituminous macadam surfaces, must be superior. Numerical data or experimental evidence on this subject is as yet meager. It is not difficult, however, to draw certain definite conclusions when we consider the nature of the materials involved. It is well known that macadam roads have rutted under heavy loads. For ruts to develop rapidly it is quite evident that some shearing of the macadam surface occurs. Of course, rutting also takes place, because of wear and lateral displacement of stone. The capacity of concrete pavements to resist shear is relatively much greater, and we may perhaps note this is the first point of superiority of concrete over macadam pavements for sustaining normal loads.

It is common practice to assume in designing concrete bridge floors that normal pressures over an area are transmitted through the slab in lines of pressure whose boundary surface is conical, with elements at an angle of 45 degrees or more with the horizontal. It scarcely needs demonstration that the same assumption can not hold for macadam slabs, i. e., normal pressure can not be transmitted by a macadam slab over as large an area of the sub-grade, and this, it is reasonable to record, is a second advantage of concrete over macadam construction.

We may, if we choose, compare concrete road surfaces with macadam road surfaces, assuming that each is an arch between curbs. It is not difficult to visualize the superiority of concrete as an arch in the following way: Consider the entire sub-grade carefully removed from a macadam road surface; there is already some doubt in your mind as to whether the surface would stand alone. On the other hand it is easy to see the complete concrete slab crown not only standing after the removal of the sub-grade, but to also see this arch of concrete sustain considerable load without a sub-grade, so that we must admit the third superiority of concrete roads over any macadam construction in their action as an arch to sustain normal pressure.



EDWARD M. HAGAR, PRESIDENT ASSOCIATION OF AMERICAN PORTLAND CEMENT MANUFACTURERS

Up to the present time, we have not been concerned greatly over the presence of heavy loads upon our roads. There is now, however, evidence that we can not place an upper limit on the loads which may be expected to travel almost any newly built road. The practice of delivering coal, for example, in large quantities by motor trucks is rapidly increasing. In the vicinity of towns there seems reason to believe that this practice may wholly supplant the delivery of coal by wagons in small lots. We must frankly admit that whatever method of transportation over roads proves the most economical will be adopted. It does not seem likely that in the long run restrictions upon the weight of loads will increase and it, therefore, is very evident that future road surfaces must be constructed with an ample factor of safety, in view of probable increase of traffic, both numerically and in unit tonnage.

From the comparisons made above between Portland cement concrete and plain macadam or bituminous macadam, it is evident that we may be practically assured that the Portland cement concrete road is far better able to meet the changing traffic conditions than either of the other surfaces. From our knowledge of the strength of Portland cement concrete, we can design a road surface of this material to meet practically any traffic requirement.

#### Discussion.

Mr. McCullough: What effect would it have on a city street to build a subgrade, provided we took care of the subgradings and put on the plank in the pavement instead of the concrete? Do you think the concrete mixture in the sand would cause it to crack?

Mr. Page: I do not think it would overcome the crack. I believe that the cracks would be due



E. N. HINES, ROAD COMMISSIONER, WAYNE CO., MICH.

largely to the construction, and, of course, it dries from the upper surface down and probable interference would be brought about.

Mr. McCullough: Do you believe that no pavement is permanent without the use of concrete?

Mr. Page: I should say there could be no permanent pavement, even if concrete be used.

Mr. Hines: For reasonable permanence there should be greater assurance where you have concrete base.

Mr. Page: In practice today almost all city street pavements are being put in with concrete foundations. In fact, all engineers given the best foundation possible.

Mr. McIntyre: Mr. Page made the statement that there is a movement of three-fourths of an inch due to contraction. Is there no expansion taken care of by that three-fourths inch widening due to setting?

Mr. Page: They will develop cracks, even if the expansion joint is used. I believe that if the concrete is properly cured and given enough moisture for the first two or three weeks there would be no expansion. I think it would have a maximum expansion at the end of that time and would leave practically an almost contact joint.

Mr. McIntyre: I would like to ask if there is any great difficulty found in getting the material to adhere to the concrete?

Mr. Page: We have not much doubt on that subject. In 1909 we laid three sections in New York and in cooperation with the Cornell University we laid twenty-five types of road. We had both tar and oil, and some was left of each, but not enough to cover the third section. The engineer in charge mixed the tar and oil together and put moisture on the third section. But the asphalt pavement, which in no case has concrete foundation now, adheres perfectly to the concrete, and it is possible that by making too smooth a surface these edgings might not adhere as well as in rough surfaces.

Mr. McCullough: In regard to expansion, by putting oil in the concrete what effect will that have, provided there be a shortage of oil in the moisture?

Mr. Page: We had oil in concrete down two years this month without any cracks in a one-and-a-half mile road laid in Harrisburg, Pa., ten per cent Portland cement laid without any expansion joint, and we laid 300 feet at Washington and 400 feet in the burrough of Richmond, N. Y., and both in the burrough and in the Washington work the construction was very bad. In another of these sections there were cracks the day after it was laid, but it was developed that the manner in which it was laid was imperfect. In Washington we laid four very short pavements of different aggregates and the engineer in charge of the work let it stand ten rolls before the final set—and, I think, with disastrous results. Yet it has been down two years.

Mr. Kenney: In streets which have to bear automobile and other heavy traffic, such as coal and truck wagons, etc., do you figure it will require a greater thickness of concrete, or will the ordinary construction suffice?

Mr. Page: They are running ten-ton coal wagons now and the city authorities let them. So far they have given the proper distribution of load and made the tires wide enough. I know in Washington they formerly had two or three large steel money wagons and it took three large horses to pull one of these wagons. But two years ago they substituted these three money wagons for one enormous motor truck—a great steel wagon which will carry \$4,000,000 in paper money a day—and we let them run it through the parks now because it does not go at sufficient speed to put a rut in the surface of the road. In fact, we think it benefits the road.

#### EDWARD N. HINES, WAYNE COUNTY MICHIGAN, ROAD COMMISSIONER.

In order to obtain a correct understanding of how and why Wayne County is committed to the concrete road, it is necessary to go back a little and show the various attempts made to properly solve the road problem. Bad roads, like the poor, have always been with us. Over sixty years ago Wayne County attempted to settle the problem of giving fifty or sixty year franchises or charters to such companies as might be formed to build toll roads leading out of Detroit. The leading citizens of that period, such as Gov. Lewis Cass, Zachariah Chandler, Henry Ledyard and others, interested themselves in these toll road projects.

The first route picked out for their experiment—for such a venture was then unheard of in this country—was the Howell line via Farmington, the old Grand River road that Congress had opened in 1832.

There were two methods of road-building in vogue at that time. One was the corduroy method, or the embedding of solid tree trunks in the road bed; the other was the plank-road method. The latter was adopted, and work was begun. The results were at first disappointing, owing to the manner in which the planks were laid. Stringers had been placed at either side of the road, and the boards, all of solid oak that would today be hard to match, even for interior finish, were spiked down. Under



GRAND RIVER AVENUE CONCRETE ROAD, DETROIT.

the heat of the sun they warped, and in wet seasons the water accumulated underneath, so that whenever a vehicle passed, a muddy fountain spouted up between the planks and deluged both goods and passengers. The end sleepers were accordingly dispensed with, and the planks laid directly in the earth with the ends covered with earth. This remained the favorite method of road-making until some one started the use of gravel, which superseded plank on most of the toll roads.

Years before the expiration of the toll franchises on the main roads entering Detroit, the toll companies, to all intents and purposes, abandoned everything except the collection of toll; and since the traffic from the outlying districts converged towards Detroit, the nearer the city you got the poorer the roads were. In fact,



BUILDING A CULVERT.

during the late fall, winter and early spring months, they were impassable quagmires of clay or sand, with entirely inadequate drainage, wooden culverts and tumble-down bridges, merely pointing out a direction, and holding out in their sodden ruts and undrained surface the questionable consolation that somebody had previously passed that way.

The constitution of the state was amended in 1893, after which the county road law was adopted, making the county, instead of the township, the unit for the building and maintenance of such principal roads as it may desire to adopt as county roads. In order to conform to public sentiment as it existed at the time, the law provided that it should be operative only in such counties as voted to adopt the county system. Numerous counties saw the benefits to be derived from building their roads under skilled and intelligent supervision, and quickly adopted the system. Not until 1906, after a campaign which had been carried on for years, was the question of adopting the county road system submitted to the people of Wayne County, at which time the proposition was carried by an overwhelming vote.

Unfortunately, however, for the success of the plan, some changes had been made in the law to fit conditions in Wayne County, and these changes started the unprogressives into action with resulting litigation. Before a road of road was built, two injunction suits were fought and defeated; quo warranto proceedings were instituted against the commission appointed to carry out the provisions of the law. The commission contracted a debt of \$25.00, and upon being refused an audit, started mandamus proceedings to force the matter. The proceedings were carried to the Supreme Court on a writ of certiorari and the commissioners were ousted from office. Thereupon, the state legislature being then in session, was appealed to, and the law amended on the points where the Supreme Court indicated that it was weak or ineffective. Petitions were circulated asking for a special session of the Board of Supervisors, the legislative body of the county, who duly convened and appointed another Board of County Road Commissioners. When this board attempted to carry out the provisions of the law they were again refused an audit of the first debt they contracted, and they again started mandamus proceedings. By this time a year had passed, and it was determined to make a fresh start by recommending that the first good roads tax levied be paid back and a new levy of  $\frac{1}{4}$  of a mill be authorized by the Board of Supervisors, which plan was followed, the  $\frac{1}{4}$  mill tax yielding a fund of about \$85,000. The following two years  $\frac{1}{4}$  of a mill tax was levied and last year a half-mill tax. The results attained by the expenditure of these various sums were so conclusive, and such a senti-

ment was created, that the county bonded itself for \$2,000,000 to be spent in five years.

The initiative on this bonding proposition was not taken by the county road board, but in its inception was fought by them because it was proposed to spend the whole amount in one year. A compromise was finally arranged on the basis of extending its expenditure over a period of five years. The concrete road was the great factor in bringing about such an overwhelming sentiment for large appropriations. I feel that had we continued building the various kinds of macadam and gravel roads which we started out to construct, with their high maintenance charges, their constantly forming ruts, their muddled up condition in the fall and spring months, and their general unsatisfactoriness, there would not have been created the sentiment which now exists.

The framers of the county road law wrote more wisely than they knew, particularly in the provision which gives the board authority to "grade, drain, construct, gravel or macadam any road under their control, or place thereon any form of improvement which in their judgment may be best." We may also do the work ourselves or let it by contract. This phase of the law was especially valuable, as it permitted us to go ahead along new lines if we so desired, without the intervention or sanction of anyone who was opposed to a change merely because nobody else had ever done it that way before. Furthermore, by being able to do the work ourselves it was not slighted in any particular, and the experience of the Wayne County Road Commission is particularly valuable because we were not committed to concrete at the outset.

Detroit is the heart of the automobile world, and the number of automobiles owned per capita is comparatively very high. This new vehicle quickly demonstrated here, as elsewhere, the purely temporary character of many so-called good roads. The automobile picked up the good roads in fine particles and scattered them over the countryside. The modern demands upon highways demanded new methods and new materials, and we used concrete to meet these demands.

As previously stated, the commission when first organized, followed the accepted practices and started in to build bituminous macadam roads; but after a year's experience in noting the wear upon them, foreseeing a constantly increasing maintenance charge, and harking to the world-wide cry, "What shall we do to save our macadam roads from the ravages of the automobile?" decided that a change was not only desirable, but necessary, and we set out to find a more permanent and durable material which would approximate in initial cost that of a first-class macadam.

After thoroughly investigating the subject, studying the experience of nearby smaller towns in the matter of concrete cross-walks, inspecting concrete bridge floors and noting the general satisfaction concrete was giving in other forms of construction, the grades of material used, the light form of construction as applied to cross-walks and bridge floors, we decided that a concrete road would come more nearly realizing the ideal than other

forms. The points considered as being in its favor were: Comparatively low first cost; low maintenance cost; freedom from dirt (there being no detritus from a concrete road in itself); its comparative noiselessness; ease of traction for vehicles of all descriptions, and the small crown necessary to get rid of surface water. We crown our roads but one-quarter of an inch to the foot, which tends to distribute the traffic over a greater area of road, instead of following a defined wagon track such as usually exists on macadam and like roads, and which later means the development of ruts.

While we were reasonably sure of our ground, we also felt that in case we scored a partial failure we could use the concrete for foundation purposes. Three stretches of road, aggregating two miles on varying subsols, and with differing specifications were decided upon. Woodward Avenue was selected for the first test, on account of the enormous and varying traffic it is called upon to carry. It is a continuation of the principal main paved retail street of Detroit, leading to the state fair grounds, Palmer Park, a popular playground, two large cemeteries and to Oakland county, a rich farming section, whose hills and gravel roads combine to make a very popular and much traveled automobile drive.

The subsoil is of a gravelly nature. A specification was devised for a concrete road in two courses, the bottom course of a 1-2-3 mix four inches deep, of limestone; and a top or wearing course of 1-2-3 mix of crushed cobblestone  $2\frac{1}{2}$  inches deep, the whole being laid in section of 25 feet, with varying forms of expansion joints. No more than 20 minutes were allowed to elapse between the laying of the two courses, so that a true bond would be effected between the bottom and the wearing course. The metal was 17 feet 8 inches wide, with a minimum width between ditches of 24 feet. Suburban trolley tracks occupy one side of the road, which is drained by 3-inch land tile laid between the rails and the concrete, and the other side by an open ditch.

The second experimental road was built on a sandy foundation of a 1-2-4 mix of washed pebbles ranging in size from  $\frac{1}{4}$  to  $1\frac{1}{2}$  inches, and washed sand from  $\frac{1}{4}$  to 6, built in one course 6 inches deep. The third stretch was built on clay, with specification similar to the one used on Woodward Avenue Road.

In coping with the expansion we used several kinds of experimental joints. Two thicknesses of 3-ply tar paper were used in some sections; a southern pine board  $\frac{1}{2}$ -inch wide was used in other sections; a composition of asphalt, still wax and pitch was tried in still other sections; and in still others the edges were protected by an angle iron embedded in the concrete, and the space between adjacent sections filled in with the above composition.

These roads are starting on their fourth year of wear and, barring longitudinal cracks, are as good as the day they were built, and practically nothing has been spent on their surface for maintenance. On the basis of three years' thorough trial, I stand committed to the use of concrete for country roads. I also believe concrete to be an ideal form of paving for village and city residence streets and alleys. This is not a statement born of enthusiasm on the spur of a moment, but a cold-blooded dollars and cents view, based on results attained and arrived at after careful consideration of all the facts available and experiences undergone.

This year, providing we can obtain sufficient materials to carry on the work, we will build about 40 miles of concrete. In addition thereto, we are planning to spend by far the largest part of the \$2,000,000 bond issue for concrete roads, and expect to get \$2,000,000 worth of value for the money expended.

It is to be expected that on our first experimental work we did not achieve perfection. We did not use the same care as we are today exercising in the selection of a clean aggregate or a good mix. Neither were we so careful about striking off and finishing the surface. I believe I am safe in saying that the concrete roads we are building today are 25 per cent better than our first efforts. We have abandoned entirely the construction of two-course roads built of crushed cobblestone, because of the difficulty of securing a suitable supply of properly graded material of this character. Crushed stone also contains a greater percentage of colds to be filled, and we have standardized on the single course road.

We have also devised numerous other improvements in our methods of construction, and in our specifications, which we believe will add materially to the life of our concrete roadways, and to the enjoyment of those who use them. Among the more important changes have been:

1. The increase in the amount of cement used in our mix, changing from a 1:2:4 to a 1:1 $\frac{1}{2}$ :3 mix.
2. A more stringent specification as to quality of stone and sand, especially with relation to its freedom from clay, loam and other foreign substances.
3. An increase in the depth of the work from 6 and 6 $\frac{1}{2}$  inches in not less than 7 inches.
4. A protecting plate at the expansion joint.

Three years ago we tried an angle iron on several expansion joints on Woodward Avenue Road, and the re-



VAN DYKE ROAD NEAR GREENWOOD CEMETERY.

suits of this experiment were so satisfactory that on most of the roads built this year we have adopted a similar device, which is really a development of this angle iron idea, viz., a soft steel plate  $\frac{1}{4}$  inch thick, 3 inches wide, provided with shear members which tie it securely to the concrete base and wearing surface. These plates are clamped to a dividing board shaped at the top to conform to the crown of the finished road, and two thicknesses of three-ply asphalted felt (about  $\frac{1}{4}$  inch), cut the entire depth of the concrete and inserted between the plates. By the use of the above device we have materially strengthened the weakest part of a concrete road, as it largely removes the possibility of wear at the points, resulting in an even and uniform surface. While these joints are more expensive than the ones formerly used, we consider the additional expense a good investment and an ultimate economy. For our 1912 work we have again changed our specification by providing a contraction joint of the above plates to extend longitudinally through the center of our roadways by which means we hope to eliminate all cracks.

Wayne County is poor in good road material, and practically all the stone and sand we use has to be shipped in. The county is flat and therefore, not easily drained, and the subsoil is largely clay or sand. We prepare and shape our subgrade, rolling it hard with a 10-ton roller, and lay the concrete right on the natural subsoil. Side-rails of 2 x 7 inch lumber are used, and these are protected on top by a 2 inch angle iron. When the concrete has become sufficiently firm to permit the removal of the rail, the finishers pare off the outer edges, which are formed next to the rails, to prevent a sharp division line between the concrete and gravel shoulders.

Our trunk roads are built 16 feet wide with gravel shoulders 4 feet wide with a minimum width of 24 feet. We have also built concrete roads of 9, 12 and 18 feet.

When first put down the concrete is thoroughly tamped in place and when this is done no workman is permitted in any way to disturb the concrete by stepping in it or throwing anything on it. The strike-off men use a plank trimmed to the curvature of the road and iron-bound on the edges. It rides smoothly on the iron edges of the form boards or rails at the side of the concrete, and is handled with sufficient care to eliminate the necessity for any considerable floating by the follow-up men.

These floaters work on a bridge which rests on the form planks at the edge of the road so there is never any contact with the concrete. This rule to keep off the concrete is rigidly enforced. Smoothing is done with simple sodden floats of home manufacture.

Each day's work is finished up to an expansion joint and no more than 20 minutes is permitted to elapse between batches during the day. The work of the day is covered with canvas and the next day the canvas is removed and the concrete covered with any sand or loose soil that may be available to the depth of about two inches to keep the concrete from drying out. The concrete is sprinkled several times daily for 8 days. Roads are not opened for traffic until at least two weeks after the last concrete is in place. The gravel shoulders are put on in two layers each 3 inches deep, and rolled with a 10-ton roller. This work is not started until the adjacent concrete is at least 3 weeks old.

Machinery is used wherever the same or a better result can be secured, and it is a unique spectacle to see the large hauling engines of the commission steaming ahead of from 2 to 4 large wagons, each loaded with 7 tons of stone. Graders are also drawn by steam, doing the work of 6 to 8 horses, more efficiently and more rapidly. Old roads are rooted up with a scarifier or gang plow. Water is pumped for miles by gasoline engines; and many smaller economies and labor saving devices designed by the commission or its employees are in use. Cement is mixed in a mechanical batch mixer that moves under its own power, and from which a boom projects, capable of being swung in the arc of a semi-circle.

The mixed material is dumped into a bucket which is run out on the boom and deposited on the road where it is wanted. Each batch of concrete is turned over three complete revolutions dry before the water is added. A wet mix is used.

Hauling materials to the road to be used, as the mixer and the gang work backwards towards the base of supplies, is done with considerable nicety, so that it is usually unnecessary to haul in extra sand or pebbles to make a properly proportioned batch.

The concrete roads in Wayne County have cost from \$1.04 to \$1.75 per square yard complete. The figure varies with the cut and fill required in grading, the price of materials, which varies at different railroad sidings, and the length of haul for materials. The figures given include the cost of concrete culverts, concrete tile drains, land tile along the street car tracks, open ditches, grading and the earth or gravel shoulders. Yardage is figured on the concrete only; the cost of gravel shoulders, etc., being apportioned over the concrete yardage and added to its cost.

During the year just closed less than \$200 was spent for maintenance on about 30 miles of concrete road, and this money was used practically for cleaning out ditches and trimming up the shoulders, and not on the concrete surface itself.

New methods and new ideas are contagious, especially where they produce results that are apparent to even the casual observer; and my own city of Detroit has taken up the work in an experimental way. Collins Avenue, for about one mile, is paved with concrete, and is now in its second year and is giving the best of service and satisfaction. Teamsters and automobilists drive blocks from both directions to get onto it. It shows no signs of wear, and in the near future other concrete streets will be built here with a resultant saving to the property owners and taxpayers. Several concrete alleys have also been built in Detroit.

The village of Highland Park, which adjoins Detroit, and whose northerly limits is the starting point of the first concrete road built by the county road commission, has built 5 residence streets of reinforced concrete, and is planning to build more. The village of Hamtramck, which also adjoins Detroit, has observed the value of concrete roads which we built in Hamtramck Township, and has built two streets of reinforced concrete.

And community that wants a good road, a road that is cheaper for even a short time under fairly heavy traffic than any other good road, a road that is inexpensively maintained, a road that is sanitary and dustless, a road that is not slippery, a road that affords good traction for any type of vehicle 365 days in the year, a road that in the long run, say 10, 15, 20 years and longer, is the cheapest of all good roads, should investigate the merits of concrete.

The results we have secured can be secured anywhere if strict attention is paid to detail, care is used in the selection of good clean stone and sand, and the proper proportion of a standard brand of Portland cement used, coupled with good mixing and care in finishing the

surface so it will not be full of depressions. It will not pay to stint the amount of cement used if good results are expected and there must be adequate, intelligent and honest supervision.

I feel that the experimental stage of the concrete road has passed. Further discoveries in the line of economy and service may be made in the future, but from the results already secured we are justified in advocating the use of concrete as a proper solution of the good roads problem.

#### The Discussion.

Mr. Hagar: That means a great deal to not only the cement manufacturers but to the country in general and I think we are very fortunate at this particular time to have this agitation, because the demand all over the country is for the solution of the problem. We hope and believe that Wayne county has solved the problem and I particularly urge everyone to go and see those roads.

Mr. Kelley: Do you use reinforced concrete?

Mr. Hines: Wayne county has used no reinforced concrete. The reinforced concrete was built by contract in Detroit and No. 7 mesh wire was used. I have not paid much attention to just the method because we have been pretty busy. But we will see tomorrow some of the reinforcement which has been laid.

Mr. Springer: You spoke of the difficulty of drainage because of the lack of area the commission has jurisdiction over. I would like to ask if in your opinion and the experience you have had, it would not be possible if your state provided the



WILL P. BLAIR, SECRETARY NATIONAL PAVING BRICK MANUFACTURERS' ASSOCIATION.

department head with jurisdiction over all roads in the state?

Mr. Hines: We can acquire jurisdiction over all roads in Wayne county. The county road law provides a method for the county board to acquire jurisdiction. A survey must be made and filed with the state highway department. It must be duly entered by a yeas and nays vote, and a certified copy of it made, and it then becomes a county road; but we take over no roads we acquire ready to improve because of our inability to do so and the fact we have 1,370 miles of roads in Wayne county. This would necessitate doing the grading in the spring and would mean giving away money without getting results. I doubt whether the state highway department, operated along the lines of the highway department in New York, would properly solve the problems in Michigan, because of the overhead cost.

Mr. Springer: You refer to the expansion joints as construction joints. Based on the information contained in Mr. Page's paper that the nature of cement in maturing was to contract, a joint that simply expands the two sections of cement is quite sufficient because the steel construction would give sufficient room for expansion.

Mr. Hines: We took twenty-five feet as an arbitrary distance. We have not any doubt, really, as to whether twenty-five feet is a correct distance or not. Our joints are now practically about one-fourth of an inch and asphalt felt is put in to keep the moisture out.

Mr. Springer: Where you referred to longitudinal cracks—are they not caused by heating of the soil?

Mr. Hines: The bulk of the cracks are due to

heating of the soil. We find that the clay road is more subject to longitudinal joints than the sand subgrade roads, and I attribute it to the fact that the moisture gets in and breaks along the weakest points.

Mr. Springer: Do you believe that it would improve concrete pavements to finish them with a bituminous surface that would cause greater resiliency?

Mr. Hines: Frankly, I can not see where one-eighth of an inch of surfacing would be much of an improvement. Our idea is to get as much air out of the concrete surface as possible before we attempt to resurface with any bituminous or other material. Concrete is not an absolutely stable proposition. If we can get a maximum amount of air out of the concrete surface we are getting economical use of it and at a low cost.

The question was asked if it was found necessary to clean the streets, and Mr. Hines answered that it had not been necessary since the time they were laid.

Mr. Hines was asked his opinion in regard to placing the expansion joints diagonally and replied that to save trouble they were all laid straight.

Mr. Springer: Mr. Hines' paper is of especial interest here in Illinois because we are just taking up the matter of attempting to build some permanent roads and I have just returned from a preliminary survey of 200 miles of state roads with the engineers, to make a report on some method of raising money to finance the permanent construction of the roads, and I was very forcibly impressed with the one sentiment that I found in interviewing farmers along the line—and that was, they were opposed to repairing the road. They said they did not approve of paying out money for repairs, but if the highway department could recommend some method of road construction that was permanent they were all willing. Another question was suggested to me by the talk I had along the line with reference to heavy trucks. The first fifty miles of road which we covered, which had been a fairly good road, was literally ground to pieces by the heavy trucks, and there was much sentiment in the country for a limitation of the load that the roads be subjected to. Would that be necessary with a concrete road, and what limit would be necessary on, say, a seven-inch concrete road?

#### WILL P. BLAIR, NATIONAL PAVING BRICK MANUFACTURERS' ASSOCIATION.

The first paper after luncheon was that of Will P. Blair, Cleveland, Ohio, secretary of the National Paving Brick Manufacturers' Association. He said:

Any talk that would inspire you to add one argument in favor of the good roads propaganda would be that much done in the interest of the country. In many audiences I sometimes say that every man, woman and child is interested in the good roads movement in this country. He is interested because every bite of bread that any man takes into his mouth in this country represents a contribution to the bad roads of the country in enormous proportions and in enormous amount. If we can have any faith at all in the statistics and data that we have brought to you, we see that the transport of wheat in this country costs us twenty-seven cents per ton per mile and the good road costs us thirteen to eighteen cents—and that ten cents' difference represents the enormous amount of \$18,000,000 annually to the tribute paid, as I say, by every man, woman and child in this country.

The phases of the state construction in the question of good roads are so widely involved, so many questions of interest to both the student and the field man, that one could talk an entire day, an entire week, upon questions of very particular interest and incident to the question itself. So I have reduced to writing all that I have to say covering the subject of vitrified brick paving—things that may be of interest to every manufacturer or user of cement in this country that seems not to have been very widely known.

I take some pride in the fact that for fifteen years I knocked at the door of Congress asking that there be some provision made by which the government should lay hold of some of the research problems with which we are confronted. That campaign, as best I could conduct it, and with the aid of many engineers in this country, has finally resulted in the granting of recognition in the particular that is and has been accorded the agriculturists in this country for years and years in the establishment of a bureau of research by which some things may be gained involving the very questions that were so pressing in this matter of stresses and strains, vibrations and things to which streets, building, bridges, etc., are subjected to in this country. Finally Congress granted it and passed an appropriation by which the work may be undertaken, but it has been only in a small way.

The engineers first persuaded the officials of the bureau of standards to the measurement of the stresses and strains of buildings in New York City and the East. We would have the advantage first of initiatory research work in the city of Cleveland during the past four or five months of the past year. It is a long, laborious and tedious work, as it is an important work. We believe that we will know something more after this research work has been concluded, or at least engaged in for the next year, than we know now. I simply state this because I thought you would like to have the information.

Just at this time, we are confronted with the largest proposals of expenditure for street and road

building in the history of this or any other country. Viewed from our selfish interest, we welcome this condition of public sentiment.

The tax paying public have the right to assume the attitude of the patient whose ailment is well understood as well as the remedy therefor, neither have we the right to assign it the place of the cat, the dog or the monkey, even for the purpose of ascertaining a more effective remedy.

The thousand and one theoretical road combinations which are not only merely offered to the public, but offered with the greatest possible insistence as to their worth, are grave mistakes, and there is due to the public a word of warning both from the patriotic disinterested road student and from those interested in road building material of real worth. A word of warning may well be heeded even by those of us, who conscientiously feel that we represent a road building material well worth value received, in that we do not advocate the use of roads ill adapted to the demands and requirements.

I do not want to see public enthusiasm stifled and checked by either an attack of robbers, or discouraged through ignorance or wastefulness, rather that it shall be steadily encouraged by both honesty and intelligence.

I have been a thorough believer in the use of vitrified brick as a wearing surface for city streets and heavily traveled country thoroughfares for the last thirty-five years. I still believe that for the same money, subject to the same traffic demands, satisfaction in use and sanitary requirements are more advantageously met with a properly constructed vitrified paving brick as a wearing surface than with any other material.

At the same time, vitrified brick pavements which have not been built in the most approved manner, have made very satisfactory and economical streets, twenty years old and less, with only a sand filler, in many cities as for instance, Fort Worth, Texas, and Anderson, Indiana, where brick has been practically the exclusive paving material, and which have borne the incidental traffic of such cities since 1893, without any repair whatever. Still I view the ideal brick streets with their possibilities so unlimited, as the things so much to be desired, that I am almost inclined to say that no city or town or country district should ever build a brick pavement or country highway except after the most approved manner and method.

You ask what this manner and method is, and why the details that must obtain as a rule of vitrified brick street and highway construction.

To answer this is the chief purpose of this paper today.

First of all, let it be thoroughly understood that the proper preparation for the construction of a vitrified brick paved street or highway, costs no more nor less than that preparation absolutely needful and necessary in the construction of any other kind of road, whatsoever. This primary cost is and must be one and the same.

The excavation must be made, the fills must be made, compressed or compacted and smoothed. If not of such character to afford efficient natural drainage, an efficient drainage must be artificially supplied.

The lack of proper drainage is not the sole cause by any means, but it is one cause for cracks that appear in the pavement. At least it is the contributing cause, and so as with every other cause, it should be eliminated as far as possible.

The soils and earth that form the substructure contain more or less voids. Where the proportion of sand or gravel is sufficient for a ready flow of water, open drains at either side of the road to carry the flow of water will answer, and no underneath artificial arrangement is necessary. But where the soil is of such nature that the water can move but slowly through the openings, or where, by capillary attraction the moisture freely and readily is distributed, above and throughout, then an open tile drainage must be resorted to and it must be so arranged that the water will pass from underneath readily and quickly. Otherwise, whether artificially drained or otherwise, the amount of moisture immediately underlying the pavement in such soils will at the temperature that prevails throughout the northern portion of the country, result in such an expansive force as that it will raise any covering whatsoever that may be placed upon it, and if the covering is sufficiently brittle or lacking in strength or both, the upper pressure being unequal, a crack or break must follow, providing, however, some sufficient precautionary measure is not provided for relief.

Without meeting suggestively all of the conditions that are to be met and dealt with in the drainage proposition, two general directions may cover much of the problem.

Never undertake to carry water in open drain pipes along and underneath the pavement, but carry it immediately in open tile drains in the shortest route possible to the side ditches.

With the bed thus prepared, a concrete foundation of Portland cement, never less than one part cement to eight parts of admixture, with the broken stone or gravel and sand in such a mixture not an arbitrary proportion, but of such proportion as will reduce the voids to a minimum, must be spread and finished with a smooth surface, and this must be done with the subgrade protected as prepared, so that this concrete foundation will be of uniform depth as required and having, as I say, a smooth surface conforming to the grade of the finished street.

This requirement for a smooth surface uniform with the grade of the finished street, is too often a meaningless clause, which is written into the specifications. I have come in contact with many contractors and even some engineers who have looked upon this requirement as one of the impossible features of the specification. It is not impossible, and should not be so regarded.

A concrete foundation of uniformly smooth surface is both an easy and economical accomplishment. It neither requires excessive skill or expensive tools.

Where a curb furnishes the grade, a template may be successfully used for this purpose, but without such an advantage the grade stakes set in four or five foot squares and with the use of a garden rake and the ordinary dirt shovel in the hands of a handy man, can accomplish this requirement.

I have three pictures illustrating just how this may be done. They represent actual work under the administration of Mr. Henry Metzler, chief engineer, Columbus, Ohio, the assistant engineer, Mr. W. H. Eagle, being in immediate charge.

Foundations like this meet every requirement and are well nigh perfect. Your speaker was a witness

in one day to five jobs of concrete foundations in process of construction for vitrified brick roads, going in under the supervision of the New York Highway Commission, Engineer W. F. Perkins of Buffalo, N. Y., being in immediate charge, which were being put in with like skill.

Contrasted with this satisfactory work, I have seen a great many foundations built, where the stone projected as much as two inches above the grade line, and were full of waves and depressions, destroying utterly the value of the foundation and rendering impossible its function.

A properly built concrete foundation furnishes a most important service to the pavement as a whole. It is first of the series of wearing plates receiving transmission of the load, vibrations and impact of travel.

The one important feature in the use of the cement is the binding together of the whole into a single mass or monolith, enabling the load to be transmitted in distribution to the whole. Hence no single portion receives the entire force of any shock or impact as is the case if the foundation units as must be the case in the use of gravel and broken stone alone.

It is a most economical feature of road construction because it does not come in actual contact with any destructive force in the use of the pavement, and once properly built, it endures for all time.

Should it suffer a measure of cracking, the units are so large that in practical effect, the value of the monolithic support still obtains.

The object and purpose of the two-inch sand cushion that is next placed upon the concrete foundation, I fear, is not understood as fully as it should be, and therefore little appreciated. The uniform density as well as the uniform depth of this sand cushion, is necessary for many reasons.

It aids in preserving the concrete foundation intact.



J. S. McCULLOUGH, CITY ENGINEER, FOND DU LAC, WIS.

ing or breaking up. It acts as a relief of the impact and weight of travel. Of uniform density, its support is alike, and its resiliency is measured by the variation of both weight and force of impact that comes upon the pavement.

With it there is no danger of the foundation shattering. If perchance the concrete foundation is raised by the action of frost, the wearing surface is protected against cracking on account of such action, by the relief afforded in its cushion effect.

The office of the sand cushion not alone cares for and preserves the concrete foundation, but it equally and more so protects the wearing surface. With this cushion provided, the effect of the vibrations and impact upon the brick are far less severe. The cement filler with which the joints of the brick are filled, is not shattered and the brick do not chip.

This is true when other details are complied with in the construction of the pavement as a whole. This cushion being of uniform density, enables the brick to be placed with the best edge up and the cushion rolled and compressed so that the surface of the brick may be brought to the plane in line with the grade.

With the brick in this condition, provision for the expansion cushion having been made the application of the cement filler to the interstices next follows in the construction of the road. The purpose of the cement filler as a necessary adjunct in the quality of the brick pavement as a whole is of such vast importance and yet of so slight a volume that there is no reason why it should not always be made of the highest quality.

In order that this may be effected, an equal quantity of cement and sand must be used. To be of its greatest value it must be put in place in the given proportion.

In compressing the sand cushion, the laying and rolling of the brick as here suggested, the flow of the sand into the interstices from below is not at all pronounced, leaving the entire joint to be filled with the cement mixture, and without this joint being filled completely from the bottom to the top, I do not consider that the job comes within the meaning of either skillful or workmanlike.

In spite of the common sense influences that this

should be done in quantity and quality, very often the mixture is made so thick that its application is a mere makeshift and sham, or it is applied so that the sand and cement are entirely out of proportion. To eliminate the hazard of the application of this filler for many years past we have advocated the following direction:

The filler shall be composed of one (1) part each of clean, sharp, fine sand and Portland cement. The sand should be dry. The mixture, not exceeding one (1) sack of the cement, together with a like amount of sand, shall be placed in the box and mixed dry, until the mass assumes an even and unbroken shade. Water shall then be added, forming a liquid mixture of the consistency of thin cream. The sides and edges of the brick should be thoroughly wet by sprinkling before the filler is applied.

From the time the water is applied until the last drop is removed and floated into the joints of the brick pavement, the mixture must be kept in constant motion.

The mixture shall be removed from the box to the street surface with a scoop shovel, all the while being stirred in the box, as the same is being thus emptied. The box for this purpose shall be four (4) feet, eight (8) inches long, thirty (30) inches wide and fourteen (14) inches deep, resting on legs of different lengths, so that the mixture will readily flow to the lower corner of the box, which shall not be more than six (6) inches above the pavement. This mixture, from the moment it touches the brick, shall be thoroughly swept into the joints.

Two (2) such boxes shall be provided in case the street is twenty (20) feet or less in width; exceeding twenty (20) feet in width, three (3) boxes should be used.

The work of filling should be carried forward in line until an advance of fifteen (15) to twenty (20) yards has been made, when the same force and appliance shall be turned back and cover the same space in like manner, except that the mixture shall be slightly thicker for the second coat.

To avoid the possibility of thickening at any point the surface ahead of the sweepers and ahead of the mixture shall be gently sprinkled, using a sprinkling can, the head of which shall be perforated with small holes.

Any attempt to thin the mixture on the pavement by the application of water will result in the separation of sand and cement, and "bad spots" will appear in the pavement where this practice has been permitted.

After the joints are thus filled, flush with the top of the brick, and sufficient time for hardening has elapsed, so that the coating of sand will not absorb any moisture from the cement mixture, one half (½) inch of sand shall be spread over the whole surface, and in case the work is subjected to a hot summer sun, an occasional sprinkling, sufficient to dampen the sand, should be followed for two or three days.

In addition to the provision of the 2-inch sand cushion for providing against possible cracks in the pavements, it is advisable that a cushion be provided for, along and next to the curb, by first using a board which shall remain in place until after the pavement is finished in all other respects, after which the board is to be removed and the place filled with an asphaltic mixture of such quality that it will remain pliable throughout high and low temperature.

It is not advisable at all to put in a transfer expansion cushion. The reasons for this seemingly contradictory provision I will not now stop to discuss, but rather devote the time to the query more pertinent to this occasion, as to why we are so insistent for the use of concrete foundations for brick pavements, as well as the use of a cement mixture for fillers. There is not so much opposition or contention over the advisability of the use of concrete foundation.

We believe that in the use under the brick wearing surface the concrete fills an extraordinary useful and valuable purpose.

As used in the foundation it is not subject to a wear which as a surface material would affect its disintegration and in its use for foundation purpose, we believe we are serving the public a real interest in the advocacy of its continued use.

To sum up, it is the best material for the purpose of which we have knowledge. There is, however, much opposition and contention against the use of Portland cement as a filler for brick pavements. This, of course, comes of persons from the viewpoint of their commercial interests.

Why are we so insistent in the use of cement in the construction of brick street pavements. It is simply because by its intelligent use, as outlined in the foregoing, we sincerely believe that it furnishes pavements having the greatest durability, greatest ease of traction, the best sanitary qualities, and is the most comfortable pavement in use.

It is not excessive in first cost, and together with the least cost of maintenance, makes the most economical pavement known.

Either the twitting, that if cement is good for the interstices, why should it not be good for the whole pavement, or the carping suggestion that the use of cement is only good to protect a poor brick are mere commercialisms and do not stand for anything at all in the face of an intelligent inquiry into the respective value of road making material and practice, and so long as the indisputable proof is afforded that the use of cement in the construction of brick street pavements make the best pavements for the tax-paying public, I believe that the best interests of paving brick manufacturers are conserved by the use of cement.

It is not a good answer against the further use of cement to say that there are failures in brick streets attempted to be constructed as suggested in this paper, for such a statement in the face of thousands of fifteen-year-old brick streets in the country, that have not called for repairs at all, is rather a confession of inefficiency and lack of ability; nor shall the approach to the conflict of interest in any whatever deter us from a continued advocacy of the use of the cement filler.

In the use of a cement filler, the important element of ease of traction is greatly assisted. By it a monolithic surface is formed, the brick protects the thin portion or joint of cement insuring a uniform wear upon the whole surface. In the earlier use of such a street the slight unevenness of the brick which will obtain for the first few years, according to the amount of traffic upon the street, will prevent slip-

ping and skidding which otherwise might occur owing to the film of ice that is always present upon every No. 1 paving brick. As this glazed film in time disappears, the roadway becomes smoother, the granular surface follows, which for ease of traction is not found with any other form of pavement whatsoever, and is never approached in the case of a brick or stone pavement constructed with any other filler.

The hardened joints of cement filler is sufficiently tough and will stand the shock from the impact so that it will not shatter. With the relief afforded by the uniform two-inch compressed sand cushion, required as a necessary adjunct in the transmission of the load to the monolithic wearing plate, this joint is not broken. The vibrations of the impact upon the wearing plate are distributed without injury and the load is not concentrated wholly upon any individual brick. With the monolithic plate resting upon the uniform cushion support, the cushion itself is not affected or disturbed except to the minutest extent. Whereas, in the use of the soft filler, a continuing maximum disturbance occurs. The brick are subject to a constant displacement. Their support cannot be uniformly maintained, hence the surface is divided into as many planes as there are brick in the street.

The force of the entire weight where the soft fillers are used is directed to the single brick as the wheel or stroke comes in contact with the same. The brick do not chip where the cement filler is used. They do chip where the soft fillers are used. The street grows better as it grows older, and the smoother it wears the less slippery it becomes. Of course this does not hold good indefinitely, but it does hold good for an undetermined number of years. It is certain with the use of soft fillers chipping at the corners and edges of the brick immediately follow the use of the streets. In case of granite resulting in a smooth rounded condition of the stone, subjecting the horses to most cruel and incessant short slipping, impairing their value and shortening their lives.

The wear on the cement filled streets is scarcely perceptible from year to year. It is slight and level, and in continued harmony with the grade of the street. No waves or depressions are produced. Hence the impact is always at a minimum, it follows the wear must be likewise so.

At whatever angle conceivable the advantage is with the cement filler, both as to ease of traction and durability.

Accepted information from medical scientists impose a duty of co-operation upon the engineering profession that cannot be ignored. The cement filled street makes the sanitary requirement at a maximum. There can be no contamination of soils underneath, and the accumulation of offal and filth can be taken from the street with the least trouble, less expense and more completely than from any other form of pavement surface known.

The slushing of streets with water which is objectionable to other forms of paving do not obtain with the cement filled brick pavement.

Comforts in use with the cement filled pavement necessarily follow the possible condition resulting from such construction. An automobile ride on a cement filled brick road is a real luxury. The short jiggling, jolting effect is absolutely absent. Waves and depressions do not exist. The extraordinary durability and ever-ready condition. The only condition lingering, that of noise, is more of a dream than a reality. Noise from a cement filled street is often due to other avoidable causes. One thing is absolutely certain, the noise from a cement filled street is comparatively slight, alongside that which comes from a street where the filler does not protect the edges of the brick or stone from chipping or wearing into a boulder-like surface. All that I have said in connection with the construction of brick street pavements applies with equal force to construction, building and use of granite and stone pavements.

This, therefore, is our unvarnished and, as we believe, impregnable position in the matter discussed. It leads to an earnest and sincere co-operation for the extended use of the commercial product of this association.

We are sincere in our attitude and we must be both honest and just, or our influence in the advocacy of this position cannot stand as worth while. In the uplift and betterment of the civilization with which we have to deal it is becoming more and more discriminating and intelligent, and therefore only to the extent that we are right can we succeed.

My sincere thanks are due, and are now extended to this association and its secretary, Mr. Wilson, for this opportunity.

#### Discussion.

Mr. Boynton: I would like for Mr. Blair to define definitely what he means by cement aggregate for concrete base.

Mr. Blair: I mean by that, nothing more or less than Portland cement. I agreed with what Mr. Page said this morning. A soft mixture should be made, in my judgment. Specifications in this country speak definitely of a 1-2-3, 1-5-8 or whatever mix is desired. The material has to do with it and you have got to judge the mixture by the material you have in hand. I do not mean to say that it should be the least lean. Concrete is often ruined by a mixture of five parts broken stone and three parts other material after it is aggregated. It does not fill the joints and you have bad concrete, and there must be judgment exercised as to what the ingredients are. But I would not have it any leaner than a 1-3-5 mixture.

J. S. McCULLOUGH, CITY ENGINEER, FOND DU LAC, WISCONSIN.

Mr. McCullough described the concrete pavement in this city. He said:

The great change in character of traffic in the past few years principally on account of the advent of the motor driven vehicle has made necessary a corresponding change in requirements of highways and streets to carry this new traffic.

Where, in the past, the ordinary water bound ma-

cadam would withstand to a reasonable extent the wear from slow moving, horse-drawn vehicles, it is admitted by road builders, inadequate for the automobile and motor truck traffic of the present.

To provide for these changed traffic conditions is engaging the attention of highway engineers and public officials everywhere. It is not the purpose of this paper to enumerate the various methods and types of construction that have been developed recently to overcome the changed traffic conditions but to describe one type of pavement which has gained wonderfully in popularity in the past few years; namely, the cement concrete pavement.

Although the idea of building a pavement of cement concrete is not new there were very few of that kind built until a few years ago.

In 1907, when Fond du Lac, Wisconsin, was investigating the matter, we could find only about half a dozen places in the country that had such pavements, with the exception of those laid under patent.

As an evidence of the growth of this form of construction in public favor, I beg to refer you to Municipal Engineering for April, 1912, in which city officials from 31 states in the Union report in round numbers, 50 miles of concrete pavement built on city streets in the season of 1911—not including many miles of Hassam pavement in Portland, Oregon.

The forecast for season of 1912 in the same report is for over 100 miles. This shows a remarkable increase for this type of pavement in a very few years.

In our own experience we have endeavored to build a cheap pavement, eliminating all items of cost that did not promise a positive improvement. For that reason we do not go to the expense of blocking off the wearing surface to give the appearance of block pavement.

We do not protect the edges with angle iron or other form of protection, as the traffic on most of our streets is so light that we have not considered the expense warranted. I would, however, recommend the protection of edges of cross street expansion joints on streets carrying any considerable traffic.

We do not consider with our method of finishing wearing surface that much crown is necessary, and in fact believe that the less the crown, the easier the slab will contract, and consequently help to overcome the tendency to crack longitudinally down center of street.

Our standard amount of crown is:

3" for 24' street.  
3 1/2" for 27' street.  
4" for 30' street.  
4 1/2" for 32' street.

With our method of finishing wearing surface, we find this sufficient crown. Our specification briefly described is to grade and roll the sub-grade, and put combination curb and gutter, same as for a brick, creosote block or asphalt street, making due allowance of course for the difference in total thickness of pavements.

Most of the contractors prefer to grade the width of the roller on each side, first for curb and gutter, rolling this thoroughly and then put in the curb and gutter, doing in the center of street after gutter is built, and can be used to run the gauge on for testing the grade.

The rolling should be carefully and thoroughly done, and care taken to get all sewer, water and gas pipe trenches well rolled and solidly compacted.

To insure the grade being at proper elevation it is now tested with Roughen's Adjustable Street Gauge, and any imperfections corrected.

The first thing we do towards laying pavement proper is to make the expansion joint—this we accomplish by a device perfected by one of our former contractors. This is placed along each gutter, and at least every fifty feet cross-wise of the street, making a joint something less than one inch wide; we formerly used beveled siding for making these joints, but found so much trouble in getting the boards out that the new device has been used entirely of late.

The new method is preferable both on account of saving of material and time in placing and removing, and also because a much neater joint can be made with it, and there is no danger of disturbing concrete in removing these expansion plates. These plates are left in place until concrete is set. After which they are removed and space filled with asphalt filler.

Next the bottom course, 5 inches thick, consisting of one part cement, two and one-half parts sand and five parts crushed stone, is mixed and placed, being careful that a uniform thickness of five inches is obtained.

This course is tamped thoroughly by hand and the placing of reinforcing material follows:

The reinforcement used at Fond du Lac, Wis., is what is known as American Steel and Wire Company's No. 7 triangle mesh reinforcement. We place it only in the center 18 feet of the pavement slab, on the theory that the weakest place in the pavement is in the center. The reinforcing material is tamped into base enough to hold it there, and top course or wearing surface is placed immediately.

The wearing surface is made up of a mixture of one part cement, one part, absolutely clean, sharp sand, and one part crushed granite, from one-fourth inch in size down to finest; placed one and one-half inches thick. This course is put on rather wet, and then struck off with Roughen's Adjustable Gauge. The water and air are worked out with wood floats and just smoothed with a steel trowel. After trowelling, an ordinary street broom is drawn over the surface lightly from curb to curb, to slightly roughen it.

All of this finishing must be done from a bridge above the pavement and free from same. This is accomplished with an attachment to Roughen's Gauge, which provides room for two finishers to work. As soon as the concrete has hardened sufficiently to walk on, the expansion plates can be removed and asphalt filler can be poured. The work is kept sprinkled for a week or ten days, after which it can be thrown open to traffic.

The material should be clean, and care taken that careless workmen do not get dirt into the stone and sand in handling it on the street. Care must be exercised in organizing the work so that the top course is kept right close up to the base, and in fact the whole operation of placing the two courses progresses simultaneously.

We have had some gravel used at Fond du Lac that carries quite a large percentage of clay. We are satisfied from our experience with it, that it is not suitable for this kind of work and we have not used any of it on our last few jobs.

Too much importance, we believe, can not be placed

on this point in construction of this type of pavement. The aggregate should be free from clay loam or vegetable matter. Contractors should have canvas or other material sufficient to cover about one-half day's work from rain or, in extremely hot weather, from the sun.

This form of construction can be improved upon, no doubt, but for a cheap street it has been proven in our locality to be a good value.

As to the objections raised against this pavement—there have been some cracks develop, but they have been detrimental principally on account of appearance; at a slight expense the cracks have been cleaned and filled with asphalt, and on streets carrying light traffic, such as ours, will last for years.

The wearing surface as we make it is not slippery as compared with vitrified block, creosote block or asphalt in cold weather.

As to the statement that it is difficult to cut through, in case of the necessity arising to make repairs to underground work, I wish to refer to work done last year at Fond du Lac, Wis., in constructing the conduits for the Wisconsin Telephone Company. They cut a trench 18" to 20" wide through 4,300 lineal feet of concrete pavement and replaced it. The concrete was broken out in slabs the width of trench by drilling holes 10" to 12" apart on line of trench and breaking out the slab with wedges and feathers.

A small steam drill, such as is used in stone quarries, would drill about 400 feet a day, and two men could break out the slabs. After completing the installation of the conduit the cut out piece was replaced with all new material by a concrete paving contractor, and, up to the present time, have not found any places that show any defect.

The record of cost of 4,600 lineal feet of concrete pavement for the work, according to statement of superintendent of construction of the Wisconsin Telephone Company, was:

Breaking out concrete, per sq. yd.	\$ .246
Replacing pavement, original contractor's price	
paid, as provided in contract with city	1.50
Replacing asphalt joint, old asphalt used	.082
<b>Total</b>	<b>\$1.828</b>

On about 2,000 feet of brick street, the cost for removal and replacement per sq. yd. was:

Removing brick and concrete foundation	\$ .236
Cost of brick to replace brick broken in removing	.924
Relaying concrete foundation and sand cushion	.83
Laying brick	.23
<b>Total</b>	<b>\$2.27</b>

The Board of Public Works has given the Gas Company-Street Railway Company and Water Company permission to make several cuts in the cement pavements, to make necessary repairs to their pipes, etc., and we have encountered no trouble in getting the pavements replaced in apparently good shape.

Of course all such patches are noticeable, if you look for them, but the ordinary pedestrians never see them.

Our work has cost to date, including necessary grading, as follows:

In 1908—1.25 mi., 17,317 sq. yds., averaged	\$1.324
In 1909—3.75 mi., 69,197 sq. yds., averaged	1.234
In 1910—2.8 mi., 44,297 sq. yds., averaged	1.175
In 1911—.75 mi., 11,043 sq. yds., averaged	1.25
<b>Total—8.5 mi., 141,851 sq. yds., averaged</b>	<b>\$1.228</b>

This is laid on 17 streets and two alleys; 34,740 yds. is reinforced and 107,111 yds. is plain concrete. It is our opinion that, on account of the force of the movement for street and highway improvement, in order to gratify the wishes of automobile owners and meet the demands of the teaming and trucking interests, we must work towards attaining the greatest number of miles of pavement of a class that will stand the traffic, even if it may have some faults, rather than build one-half as many miles with the same amount of money, even though we would get twice as good a pavement.

I am satisfied that Fond du Lac, with her 8 1/2 miles of cement pavement, averaging less than \$1.25 per square yard, will get a good value for every dollar expended.

If in the course of 10 years it becomes necessary, I see nothing to interfere with our putting a bituminous wearing surface on these streets.

As compared with asphalt or any of the pavements costing over two dollars a yard, we can apply the argument put forth by former officials of Milwaukee, with reference to their type of bituminous macadam pavement; that is, that the difference in cost between the \$1.25 pavement and the one costing \$2.25 or over, invested at 5 per cent, will provide a fund large enough to maintain these pavements indefinitely.

Our pavements are all built on a five year guarantee, so we have no maintenance charges until first five years have elapsed.

Concrete pavement is not claimed to possess all good features and no faults. As we build it we have endeavored to build a cheap pavement; and claim for it low first cost, ease of traction, that it will stand the wear from automobile traffic, that it is easily cleaned and is sanitary, not more slippery than creosote block, will not cost much to maintain, and finally, as we have stone quarries, sand and granite practically at hand, it is the cheapest hard surface pavement we can build in our locality.

#### ATTENDANCE.

Alsen's, Mr. R. S. Sinclair, W. P. Corbett; Ash Grove, L. T. Sunderland; Atlas, W. A. Holman, E. D. Boyer; Cayuga Lake, M. E. Calkins; Chicago, N. D. Fraser, J. A. C. McDaniel, R. Crawford; Colorado, Whitney Newton; Dewey, F. E. Tyler, F. L. Williamson; Dixie, Richard Hardy; Edison, W. S. Mallory; German-American, Frits Wolru; Heiderberg, F. W. Kelley; Huron, S. T. Crapo; Iowa, H. Koch; Iowa, H. Struckmann; Louisville, T. A. Courtenay; Michigan, N. S. Potter, N. S. Potter, Jr.; Nazareth, J. H. Deboe; Newaygo, D. McCool, J. F. Lockley; Northwestern States, George P. Dickman; Oklahoma, Adam L. Beck; Peninsular, J. N. Shove; Phoenix, H. M. Fetter; Superior, Justus Collins; Texas, F. R. Bissell; Tidewater, R. M. Soper; United Kansas, W. Fague; Universal, E. M. Hazar, B. F. Albeck, B. H. Rader; Morris Metcalf, G. Berquist, J. P. Beck, C. W. Boynton; Utah, L. M. Bailey; Virginia, R. W. Kelley; Vulcanite, J. B. Lober, Albert Moyer; United States, J. E. Zahn; Western States, J. W. Shove; Whitehall, W. H. Harding; Wolverine, L. M. Wing, W. E. Cobean; Canada, Will Ford.



INSPECTION PARTY OF ASSOCIATION OF AMERICAN PORTLAND CEMENT MANUFACTURERS IN FRONT OF THE CITY HALL, ANN ARBOR, MICH.

### THE INSPECTION TOUR.

The Portland Cement Special, a train consisting of four sleeping cars, a dining car and a club car, left Chicago at 12:15 a. m., Friday, May 10, via the Michigan Central Railroad, carrying a party of about sixty cement manufacturers, road engineers, highway commissioners and other earnest investigators of the most modern type of road construction. The especial purpose of the expedition was to inspect and study the construction of the bitumen surfaced concrete pavements of Ann Arbor and the solid concrete roadways of Wayne county, Michigan.

The run to Ann Arbor was made on schedule time, and was very comfortable and quite uneventful, except that one hoary-headed youth repeatedly and insistently demanded that he be allowed to get off at Grand Rapids; however, as the train made no stops, and did not go within fifty miles of Grand Rapids, he was finally persuaded to remain with the party. Upon arrival at Ann Arbor the party was met by a number of automobiles and taken for a tour of the city streets, under the direction of E. W. Groves, city engineer. Mr. Groves called especial attention to a block of two-course concrete pavement in front of the Ann Arbor city hall, half of which is surfaced with bitumen and sand, according to the Dollarway system, and the other half with Bermudas asphalt. The Dollarway pavement showed an excellent wearing surface, which appeared to be withstanding the ravages of traffic better than the asphalt. Particular attention was also called to a piece of concrete pavement surfaced with crude tar and sand, the complete cost of which was 76 cents per square yard, of which 5 cents per square yard was for superintendence.

All of the concrete pavements inspected in Ann Arbor are in excellent condition and have every indication of permanency. The expansion joints are practically obliterated by the bitumen surfacing. The concrete is practically permanent, and the surfacing only requires renewing at intervals of about three years. The party made a very complete tour of the beautiful little city of Ann Arbor, and the neat appearance of the many attractive bungalows and cottages of concrete, brick and stucco construction was especially noticeable.

### On to Detroit.

After completing the inspection of the Ann Arbor streets and pavements, the party returned to the special train and proceeded to Detroit, arriving there at 11:30 a. m. Automobiles were in readiness, and, under the direction of Edward N. Hines, county road commissioner of Wayne county, the entire party started immediately to inspect the concrete roads of Wayne county. A short stop was made in the city for the purpose of looking at a concrete street with steel reinforcement. This type of road construction gives very substantial results, but the general opinion seemed to be that concrete roads, having a continuous bearing on a firm foundation, do not require reinforcement. The first Wayne county road inspected is on Woodward avenue. The road is constructed of a 1-2-4

mix of concrete about 6 inches thick, and has transverse expansion joints, protected with steel plates, the joints being filled with asphalt felt. It is in its fourth year of service and shows no appreciable wear. It shows some diagonal cracks which are being filled, at comparatively small expense, putting the road into excellent condition to withstand the wear and tear of the heavy traffic to which it is subjected.

After a thorough examination of the Woodward avenue road, the party repaired to Ardussi's famous hostelry, where a delicious luncheon was served. During the luncheon an unusually willing and energetic male chorus, under the able direction of R. N. Bates, B. F. Affleck and others, rendered a number of musical selections.

They were generally conceded to be literally a howling success.

Luncheon and the "musical" program completed, the party was taken in automobiles for a short run over sand, crushed stone and other bad, indifferent and dusty roads, so that when a piece of beautiful, smooth, dustless concrete road was finally reached, the difference was very remarkable, highly appreciated, and sufficient to produce volumes in favor of the concrete roads of Wayne county, Michigan. The Grand River road was carefully inspected by the entire party, and was generally pronounced to be a splendid piece of road building. This road is constructed of a 1-1½-3 mix, 7 inches minimum thickness, 16 feet wide, crowned ¼ inch to the foot. The road has transverse expansion joints, protected by Baker joint plates. It is about a year old, is a beautiful piece of work, and looks as though it might endure for all time.

### An Object Lesson.

In the tour of the Wayne county roads, Mr. Hines called attention to a very instructive object lesson in the form of a piece of badly constructed concrete road which is now being torn up. The piece of condemned road was built in 1910, at a cost of \$1.21 per square yard, and many causes contributed to its failure, among which are that the builders were inexperienced, too little cement was used in the mix, the gravel used had a good deal of clay mixed with it, the concrete was laid in cold weather, and the road was opened to traffic too soon. This road, therefore, proved to be unsatisfactory, and is now being torn up to be replaced by the latest and best type of concrete roadway.

A part of the Michigan avenue road is 6 inches minimum thickness, constructed of a 1-2-4 mix, and has transverse expansion joints without steel plates. This road shows some long longitudinal cracks; but, although these cracks are unsightly, they do not interfere with traffic in any way, show no signs of breaking down, and can be filled at little expense. All of the concrete roads of latest construction, that were inspected, are built of a 1-1½-3 mix, 7 inches minimum thickness, crowned ¼ inch to the foot, and have transverse expansion joints with Baker joint plates. The shoulders of these roads are built up with gravel and crushed stone, and it is putting it mildly to say that the

entire party was enthusiastic over their fine appearance, excellent condition and evident durability. The cost of these concrete roads varies according to local conditions, and the distance that materials must be hauled, but none of them cost to exceed \$1.71 per square yard.

L. W. Page stated that Wayne county, Michigan, doubtless has the finest concrete roads in the world; and he estimated that, to build the roads now necessary in this country, it would take the total output, for 76 years, of all the cement plants in the United States.

A short stop was made at the warehouses and yard of the Wayne County Road Commission. The commission has a very complete equipment of modern road making tools and machinery, consisting of Port Huron engines, wagons and rollers, Fairbanks-Morse gasoline engines, and Municipal cube mixers, and also has a small plant for making concrete crock or drain pipe, a large quantity of which is required, as special attention is given to the proper draining of all roads. Wherever culverts are required, they are constructed of reinforced concrete, according to an excellent design, which has been adopted as a standard by the Wayne County Commission. Mr. Hines proved himself to be an excellent guide, and won the high regard of the entire party by his many courtesies and his prompt answers to all sorts of technical questions, which displayed his thorough knowledge of the theory and the practical details of concrete road construction.

### An Informal Banquet.

After about 75 miles in automobiles over the Wayne county roads, the Portland cement party returned to Detroit and, after a short rest, attended an informal banquet which was served in the Hotel Pontchartrain. When the gentlemen had somewhat appeased the ravenous appetites caused by the long ride in the open air, Mr. Edward M. Hagar, acting as toastmaster, called upon several to express their opinions of the roads that had been inspected and the new ideas that the day's trip had developed. One of the first gentlemen called upon was L. W. Page, Director of Public Roads of the Agricultural Department, Washington, D. C. Mr. Page's remarks were very much to the point and were received with considerable enthusiasm. He stated that he had met with the Portland cement men several times previously, and had repeatedly asked them not to advocate the use of Portland cement as a road material; but that since seeing the Wayne county concrete roads, he was convinced that the future of Portland cement, as a road material, is as bright as that of any other known material. He said all the problems are not solved and the greatest trouble will be from horse-drawn vehicles. Mr. Page questioned the vital necessity of expansion joints in concrete roads, stating that he did not believe any concrete road would ever fail on account of expansion, but he believed that most of the cracks were caused by foundation troubles.

Mr. Page spoke in very complimentary terms of Mr. Hines and the Wayne County Road Commission. He said that he intended sending another

engineer to learn their method of construction, so that he would be prepared to furnish, to any community wishing to build a concrete road, full information concerning the best that has ever been done in that line. Mr. Page also stated that during this year he expects to build 1,000 feet of monolithic concrete road, 1,000 feet of oil concrete road and 1,000 feet of concrete road with bitumen and sand top dressing. The three different types of concrete roadway will be carefully watched, their merits will be compared, and the results will be given to the public.

Wm. McGinley, president of the Decatur Automobile Club of Decatur, Ill., expressed himself as especially well pleased with his trip, and what he had learned concerning concrete road construction. He stated that, as a result of the trip, he had no doubt that concrete road building will be begun in Decatur township, Illinois, this year, and that he believed that, where good foundations and drainage can be secured, concrete roads will give the best possible results.

S. E. Bradt of DeKalb, Ill., voiced the general sentiment of unqualified commendation for the Ann Arbor and Wayne county concrete roads. Edward N. Hines was received with enthusiastic applause, and expressed his pleasure in having had the opportunity of showing the Wayne county roads to the large party assembled; he stated that there seemed to be too much mention of Mr. Hines and too little recognition of the Wayne County Road Commission. He spoke in very complimentary terms of the other members of the commission, viz., John S. Haggerty and William F. Butler. He also paid a high tribute to the memory of the late Wm. Murdoch, to whose efforts and ability he attributed much of the success of the Wayne County Road Commission, in its construction of concrete roads. Richard Hardy of the Dixie Portland Cement Company, Portland, Tenn.; L. T. Sunderland of the Ash Grove Lime & Portland Cement Company, Kansas City, Mo.; Burdis Anderson of Rock Products, Chicago; G. S. Bartlett of the Universal Portland Cement Company, Chicago, and Milton Carmichael, secretary of the Detroit Convention & Tourists' Bureau, were also called upon, and, although some differences of opinion were expressed in regard to technical details of construction, no one voiced any doubt or questioned the fundamental fact that, considering first cost, utility, durability and economy of maintenance, concrete roads have been demonstrated to be an unqualified success.

Burdis Anderson, of Rock Products, called attention to the particularly pleasing and fortunate position occupied by the cement industry in its relation to concrete roads, because, by advocating the building of such roads, the cement manufacturers will help their industry, and at the same time do the world at large a vastly greater amount of good. Mr. Anderson said also that it is the policy of ROCK PRODUCTS to promote any movement that will benefit the cement industry, and to support any campaign for the development of good roads; and that, therefore, the active co-operation of ROCK PRODUCTS may be depended upon to encourage the building of concrete roads.

Milton Carmichael announced that a vigorous effort will be made to have the next meeting of the American Road Congress held in Detroit, during the week beginning September 30, 1912, for the purpose of showing the superior quality of Wayne county concrete roads to a great number of interested people.

Edward M. Hagar discharged the duties of toastmaster in his usual happy manner, interspersing appropriate introductions with a few forcible and pertinent remarks. He commented upon the general interest in the high cost of living; called attention to the fact that, in many cases, the cost per ton mile for transportation from the farm to the nearest railroad station is more than twenty times as much as from the nearest railroad station to the destination of the produce; and said that, therefore, good roads would greatly reduce the cost of living.

N. S. Potter, of Jackson, Mich., thanked the Portland cement men for bringing such a delegation of representative men to pay homage to Michigan, as having built the first and the best concrete roads in the world.

At the close of the banquet, all the gentlemen stood and drank a toast in honor of Mr. E. N. Hines; then, after some general visiting and exchanges of greetings, the party dispersed.

The consensus of opinion, very freely expressed by the entire party, was that the day had been wonderfully successful and instructive, and that May 10, 1912, should mark the beginning of a new epoch in the history of American road construction.

#### MEMBERS OF THE PARTY.

Those who composed the party were: Edward M. Hagar, B. F. Affleck, J. C. Van Doorn, B. H.



INSPECTION PARTY IN AUTOMOBILES AT ANN ARBOR, MICH.

Rader, J. P. Beck, C. W. Boynton, G. S. Bartlett, W. A. Kinney, M. Metcalf, J. H. Chubb, Robert F. Hall, Universal Portland Cement Company, Chicago; A. E. Ashbrook, western manager Dolanway Paving Company, Chicago, Ill.; W. W. Fridell, Dolanway Paving Company; S. E. Bradt, DeKalb, Ill.; R. Crawford, Chicago Portland Cement Company; F. A. Daboll, Charles Warner Company; F. A. Eckert, township highway commissioner, Decatur, Ill.; Victor Eubank, Chicago; W. R. Fague, United Kansas Portland Cement Company; H. A. Sparks, city engineer, Lansing, Mich.; E. S. Hines, Wayne county road commissioner, Detroit, Mich.; A. W. D. Hall, city engineer, Jackson, Mich.; F. W. Kelley, Heiderberg Cement Company; R. McCalman, city engineer, DeKalb, Ill.; Richard Hardy, Dixie Portland Cement Company; Wm. McGinley, president Decatur, Ill. Automobile Club; J. U. C. McDaniel, Chicago Portland Cement Company; P. H. Wilson, secretary A. A. P. C. M.; W. S. Mallory, Edison Portland Cement Company; L. W. Page, director of public roads, Washington, D. C.; A. Moyer, Vulcanite Portland Cement Company; W. A. McIntyre, A. A. P. C. Mfrs.; N. S. Potter, president Michigan Portland Cement Company, Chelsea, Mich.; L. M. Bailey, Utah Portland Cement Company; D. McCool, Newaygo Portland Cement Company; A. M. Reynolds, engineer of Park Improvement, Essex county, New Jersey; Fred Stippler, Decatur, Ill.; L. T. Sunderland, Ash Grove Portland Cement Company; N. S. Potter, Jr., Michigan Portland Cement Company, Chelsea, Mich.; J. N. Boardman, sales manager Peninsular Portland Cement Company, Jackson, Mich.; R. J. Wig, Bureau of Standards; J. E. Zahn, United States Portland Cement Company; Burdis Anderson, ROCK PRODUCTS, Chicago, Ill.; R. M. Bates, Bates Valve Bag Company, Chicago, Ill.; H. Koch, Iowa P. C. Company, Kansas City, Mo.; J. S. McCullough, city engineer, Fond du Lac, Wis.; W. Newton, Colorado Portland Cement Company; F. L. Williamson, vice president and sales manager Dewey P. C. Company, Kansas City, Mo.; F. L. Stone, J. T. Richardson, C. L. Hall, S. S. Gibney, L. G. McMahon.

#### FOR GOOD ROADS.

Washington, May 15.—An interesting exhibit at the American Road Congress to be held next fall will be presented by the United States Department of Agriculture. Secretary Wilson, of the department, has authorized Director Logan Waller Page, of the Office of Public Roads, to give a complete exhibit of the Government's work on the public roads of the country, showing how unimproved roads hurt the farmer and how improved roads aid not only the farmer but the consumer.

Four of the biggest associations which are working for the improvement of public roads are consolidating their forces in order to make the next American Road Congress the biggest affair of its kind in the history of this country. They are: The American Road Builders' Association, the American Association for Highway Improvement, the American Automobile Association and the National Association of Road Material and Machinery Manufacturers. All of these associations have previously held separate conventions. It is expected that farmers' associations and other associations interested in the improvement of public highways will likewise take part in the congress.

Picking out individual states, each in its turn,

and covering them from end to end with local associations dedicated to the movement for the improvement of the public highways, is the method that is being pursued by the American Association for Highway Improvement in its campaign to coordinate and crystallize the road movement in the United States. Fred S. Smith, the special representative of the American Association for Highway Improvement, has just reported to J. E. Pennybacker, Jr., executive secretary of the association, that the State of Florida has been covered from end to end with local road improvement associations.

Mr. Smith has been traveling in Florida for the past twelve weeks and his results give a fair indication of what the American Association for Highway Improvement, which was formed by leading officials, railroad men, professional men and others for the purpose of establishing a clearing house for the road movement, expects to accomplish in every state in the Union. In the twelve weeks in which Mr. Smith worked in Florida he covered 3,200 miles in an automobile, traversing 24 counties and 37 towns.

None of the representatives of the American Association are of the dilettante type and in his trip Mr. Smith never hesitated to get down off the platform from which he was speaking in order to show the farmers just how to construct certain types of road. While Mr. Smith's work is largely along the lines of organization, he actually aided in the work of connecting the good roads of one county with those of another county, bringing the whole state into closer and quicker communication. Many miles of road were actually constructed as a result of Mr. Smith's tour of the state and he had an opportunity to witness some of the results of his own missionary work.

The representative of the American Association for Highway Improvement addressed sixty meetings in the various counties, in some of which bonds have since been issued for the purpose of investing in improved public highways, which Mr. Smith assured them was the best investment on earth. The American Association is now preparing for similar campaigns in Illinois, Ohio, Indiana, and West Virginia. Meanwhile Field Secretary Light is doing similar work in the western states.

#### ELEVATED CONCRETE SIDEWALK.

Plans for the erection of an elevated concrete walk in Cincinnati, O., have been ordered submitted to council by Public Service Director Sundmaker. It was figured that a new wood walk would be too expensive to maintain and the concrete structure was recommended.

The State Harbor Commissioners recently let a contract for 125,000 basalt paving blocks to Wy-more Bros. at \$59.50 per thousand. The basalt block still remains supreme for paving in the heavy teaming districts of San Francisco, though the paving brick men of Seattle have been working hard to have the specifications changed. Geo. Renner, representing the local draymen's association at a recent meeting of the supervisors, declared that there was nothing to compare with basalt blocks where heavy hauling is done.

# CONCRETE BRIDGES AND CULVERTS

By THOS. H. MACDONALD and C. B. McCULLOTH Iowa Highway Commission, Ames, Iowa.

The first concrete bridge or culvert of which we have any record in this state was built in 1893 near Rock Rapids in Lyon county. This bridge was reinforced with steel I-beams after the Melan patent type of construction, and was faced with a rough cut, red stone, probably the Sioux Falls quartz-

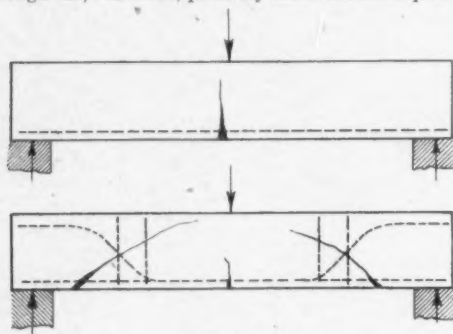


FIG. 1.

ite. When examined about a year ago the structure was in good condition, with the possible exception of the mortar in the joints of the stone facing. During the ten years following 1893 there were very few concrete structures built in the state. About 1903 or 1904 the interest of county and township road officials began to be awakened to the possibilities of this material for permanent waterways to carry the drainage under the highways of the state.

The first work of the State Highway Commission in 1904 was the building and testing of concrete and concrete materials, especially as applied to reinforced concrete for use in such structures. We began at that time to distribute plans and specifications both of standard and special designs to the road officers of the state, who made requests for them and the growth of the use of this material is indicated to a degree by the fact that in 1911 the Commission distributed upwards of two thousand blue prints of the various types of culvert and bridge construction in this state.

We believe that the better the theoretical conditions are understood by those using the material in the field, the better will be the results produced. In view of the fact that so many of the concrete highway bridges constructed in the last few years are composed of various combinations of simple beams and cantilevers, it may not be out of place before taking up the study of these various types to briefly summarize the laws governing the action of simple beams and cantilevers.

Figure 1 shows a simple slab or beam supported at the ends and loaded as indicated by the arrows. Under the action of the three forces as indicated, namely, the two abutment reactions and the load, the beam tends to deflect or bend at the center, producing a crack or cracks extending from the

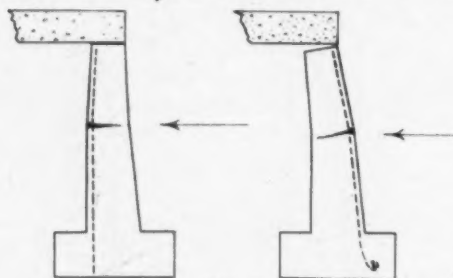


FIG. 2.

bottom of the beam upward. The reinforcement is placed perpendicular to these cracks to carry the tension and thus prevent cracking of the concrete.

In the preceding case no account was taken of the shearing forces existing in the beam. Without going into the technical details, let it suffice to say that these shearing forces so modify the direct tension, that in addition to the tendency to crack at the center, there is also a tendency toward the

formation of cracks running diagonally between the quarter point and the end of the beam as shown. This is the so-called diagonal tension or shearing crack. Two methods of reinforcing are used to counteract this cracking tendency. In the first one, a portion of the reinforcing members at the bottom of the beam are bent up, running through the concrete at an angle varying from 30 to 45 degrees, to the top of the beam and thence horizontally to the end. In the second system vertical stirrups, consisting of a series of vertical rods fastened to the main horizontal reinforcing members, and running up through the beam as shown in the sketch, carry the shear. Since the tendency to crack is greater towards the ends of the girder than at the center, the number of stirrups is increased approaching the ends. The method of reinforcing which is used and recommended by the Commission consists of a combination of these two methods, using both the bent up rods and stirrups.

Figure No. 2 is a cross-section through the body of a reinforced concrete abutment. The darkened portion above the abutment represents the superstructure which rests on the abutment. If an expansion joint between this abutment and the superstructure is constructed to permit free movement between them, the action of the earth pressure is shown by the sketch at the right hand side. This

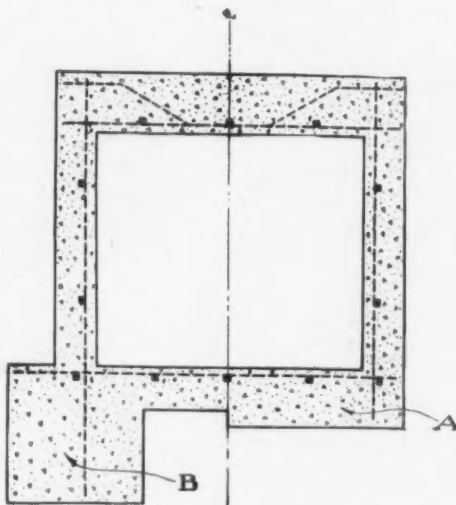


FIG. 3.

action has a tendency to produce cracks extending from the back of the abutment toward the face and should be reinforced as shown in this sketch. In the second case, as shown by the sketch, at the left hand side, the expansion joint had proven defective. The pressure of the earth under this condition produces a bulging action of the abutment and the necessity for reinforcing steel on the front face is at once apparent.

The various types of concrete highway bridges constructed in this state adapt themselves to the following classifications:

- Circular and Box Culverts.
- Slab Bridges.
- Girder Bridges and
- Arches.

The girder bridges may be sub-divided into the deck and the through types. In addition, there is the steel truss with concrete floors and abutments.

Taking these up in the order named, Figure No. 3 is of the box culvert type, showing the cross section through the barrel of the culvert. The top, sides and floor of this culvert, act as beams under the vertical loads. The horizontal earth pressure, and the upward foundation pressure respectively. Since in each case the load acts from the outside, inward, the reinforcing is placed in each case on the inside of the wall or slab. Since there are no expansion joints, no cantilever action can take place and there is no need for reinforcing on the outside of the walls. The top slab is reinforced with bent up bars, as shown, to provide for the diagonal ten-

sion as outlined above. Two types of footings are used in these culverts. The one marked "A," known as a float footing, consists of a heavy floor extending clear across the slab and depending for its stability on the wide distribution of the load. In the type marked "B," the footings directly underneath the walls are carried down to a considerable depth and are connected by a thin floor



FIG. 4.

slab built just strong enough to take the bending due to frost action.

The second type, as the name implies, consists of a slab or beam of concrete (Fig. 4) as wide as is required for the roadway, resting on two abutments. The reinforcing is for simple bending and diagonal tension. Since at each bridge seat there is an expansion joint, the abutments (Fig. 5) are reinforced near both back and front surface with rods running vertically and horizontally. The horizontal rods form a frame work for the reinforcing, bond the wings to the abutment proper and prevent cracking due to temperature changes in the concrete. The rods in the back face take all the ordinary stress. The front reinforcement is called into action only in case of the failure of the expansion joint to act properly. On this account the vertical reinforcing system in the back is much heavier. Steel bars placed both longitudinally and transversely in the footing as shown, help to distribute the footing load and to anchor the main reinforcing members.

The next view (Fig. 6) is of a cross section of a deck girder bridge. The girders are nearly rectangular in section, having a slight draw towards the bottom to admit of easy removal of the forms. These girders or stems are thoroughly bonded by means of stirrup rods to the floor slab which rests on top of it, the latter acting both as the floor and as a top flange for the girder. The load is carried by the floor to the girders and by the girders directly to the abutments. The rectangular sections at the side of the roadway serve simply as hand rails and do not help to transmit the load.

The next view (Fig. 7) is a longitudinal section of one of these girder stems showing the vertical stirrup rods and bent up rods for diagonal tension. Due to this diagonal tension, there is always a tendency for the bent up reinforcing members to fail by a pulling out or breaking of the bond near the end. For this reason a positive connection or fastening of the main reinforcing members at the end of the girder is very desirable. The next view (Fig. 8) is a detail of a system of this kind employed with success by the Commission during the last year. The reinforcing bars are bent in the shops and fitted with a hook on the end. The end plate "A" is also made in the shops and fitted with notches or slits from both top and bottom of sufficient width to admit the reinforcing bars. These notches are so spaced that when the reinforcing bars are dropped in they occupy the position as computed in the structure. After the bars are dropped in these notches, two small plates (marked B) about  $\frac{3}{8}$ " thick are bolted one to each

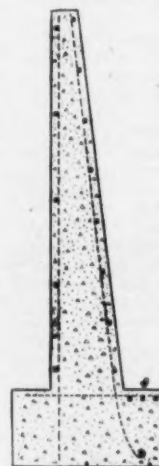


FIG. 5.

side of the plate both top and bottom, thus completely enclosing and rigidly fastening the reinforcing members.

The other type of girder (the through, Fig. 9) differs from the type just described, in that the girders, two in number, are placed above and at the side



FIG. 6.

of the roadway. The reinforcing in these girders differs very little in principle from that employed in deck girders. The girders now occupy the space occupied by the hand rail in the deck type and the floor system is hung between the two girders and reinforced transversely in much the same manner as an ordinary slab.

The last type, the arch, is shown by the next figure, No. 10. The loading comes upon the arch through the fill above it, produces cross bending in the arch ring and a thrust against the abutments. The type of abutment used commonly is known as the gravity type and consists of heavy mass concrete work depending for its stability on its size and weight. The necessity for immovable abutments will be evident from the following consideration. Any spreading or settling of the abutments will be followed by a downward deflection of the arch ring, which, in turn, produces a tendency to crack at the crown on the lower side and at points near the spring line on the upper side. The position of these cracks is sketched roughly in the figure. Any slight settlement of the abutments produces a tremendous stress in the arch ring and the necessity for adequate abutments cannot be too greatly emphasized. The last sketch is of a circular mold culvert (Fig. 11). This is a combination of the arch and box culvert type and is adapted to small culvert work where an opening not to exceed thirty or thirty-six inches is required.

#### Selections of the Types of Bridges for Different Kinds of Waterways.

There is a distinct difference in the shape and size of the drainage lines over this state, those lying within each distinct glacial area being peculiar to that area and the types of waterways built should be selected with reference to the topography. For illustration, in the broad, flat monotonous stretches of the Wisconsin glacial region, which lies in the north central part of the state, the drainage areas, are for the most part, flat and not well defined. The channels quickly fill to overflowing and a large percentage of the waterway must be obtained by raising the road grade above the land level. For such openings the slab and through girder bridges offer the greatest amount of waterway with the least rise and span. In the construction of bridges in this area the possibility of the ditch being incorporated in a drainage district must always be guarded against in planning a bridge. An instance is brought to mind of a practically new concrete bridge in Buena Vista County that is to be destroyed because the foundations were not carried sufficiently deep when constructed to provide against the deepening of the channel as part of a drainage district.

In the more rolling areas along the rivers on the east and west boundaries of the state, many of the streams have deep, sharply defined channels. During times of heavy storms the water rushes through the openings in mad little torrents that quickly scour under the foundations unless they are protected by deep footings and floors. For these deeper ravines, the box culvert with ample

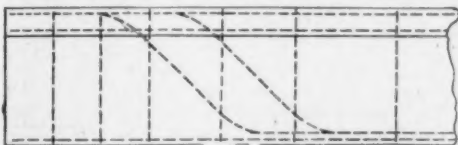


FIG. 7.

floors and footings, the slab or deck girder or arch bridge with high rise are all applicable. In the Kansan drift area which covers a large portion of the southern part of the state, the deep cut drainage channels generally exist and these types are all applicable to this section.

For spans up to about sixteen feet it probably makes very little difference in the amount of material either of steel or concrete, required to build

a culvert of either the above types provided the depth of foundation and area of waterway is the same. For spans sixteen feet and above, the character of the foundation will have much to do with the determination of the economical structure. Yellow or blue clay is about the best foundation (unless piling is used) that can be found in a majority of the counties of the state and one of these can be reached at a depth of three or four feet below the stream bed. On such foundations, the form of construction such as the slab or girder bridge, or for the longer spans, steel bridges with concrete floors, seems to be desirable as the expansion joint at each abutment will take care of the expansion and contraction of the structure as well as any settlement of the foundation without causing material cracks.

Another notable instance of the use to which concrete is being put in this state may be cited. It is that of the big grain elevator which was recently

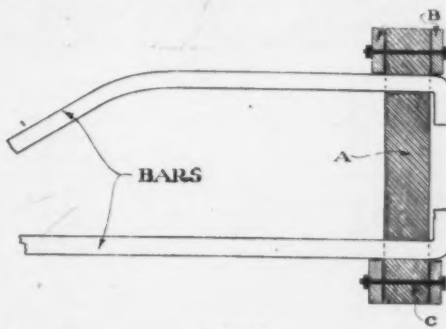


FIG. 8.

finished at Texas City. The several circular granaries of the elevator are constructed of reinforced concrete.

In El Paso and other cities large business structures have been erected during the past year of reinforced concrete, and this material is rapidly coming into favor for such purposes.

The cement plants of Texas are conveniently situated and inexhaustible. Large cement mills are in operation in the vicinity of San Antonio, Dallas, El Paso, New Braunfels and other places.

In the more western portions of Texas and all through Arizona and New Mexico where lumber is expensive, owing to the long distance that it must be shipped from the mills, concrete is found to be the cheapest and most available material for a great variety of construction purposes. The Santa Fe Railroad built all of its depots and other buildings along its Belen cut-off in New Mexico of this ma-



FIG. 9.

terial. It, and other roads of Western Texas, and in New Mexico and Arizona, have used it almost to the exclusion of lumber wherever it was possible to do so. It has been adopted generally by the railroads for the construction of culverts and small bridges. It has taken the place of iron and steel for bridge construction in many of the counties and cities of Texas and the Southwest.

One of the handsomest bridges in the United States is that across the Colorado river at Austin which was finished several months ago. It is of reinforced concrete construction and of a most agreeable artistic design.

In Western Mexico the Southern Pacific Railroad is using concrete material for the construction of its water tanks and various other purposes along its new line that extends down the Pacific slope several hundred miles.

#### TEXAS CONCRETE NEWS.

Austin, Texas, March 20.—In perhaps no other part of the United States has the use of concrete become so extensive as in Texas and the Southwest generally. The average citizen is so busy with his own personal affairs that he has small conception of the gigantic industrial enterprises that are now being actively consummated and are on foot in Texas. In these different projects concrete plays a

most important part. It is conservatively estimated that there are at present in actual process of consummation projects that will require an outlay of more than \$20,000,000. It is only within the last few years that the people of this state



FIG. 10.

and outside investors have become impressed with the great wealth of the arid lands and the opportunities for profit that are offered in reclaiming them by means of irrigation.

The story of what has already been accomplished in the lower valley of the Rio Grande by means of big canal systems and irrigation pumping plants is now an old one. The projects in that region alone represent a cost of approximately \$25,000,000, it is stated. In the construction of the lower Rio Grande valley canals large quantities of cement were used in the concrete locks, flumes, siphons and drainages. The irrigation movement has spread to more interior points, removed two hundred to three hundred miles from the Rio Grande valley section.

The series of great dams that are to be constructed by the Medina Irrigation Company in the vicinity of San Antonio, which project, it is stated, will involve an outlay of \$8,000,000 to \$12,000,000, will require enormous quantities of cement, it having been decided that the dams shall be of reinforced concrete construction.

In the construction of the great dam by the St. Stephen Land and Irrigation Company near Marfa 35,000 barrels of cement were used.

The dam that it is proposed to construct across the Colorado river at Austin will be of reinforced concrete and will require upwards of 100,000 barrels of cement.

Enormous quantities of this material are being used in the construction of the big dam across the Colorado river at Marble Falls, and the Colorado River Power Company, which is building that structure, has under consideration the construction of one or more additional dams of similar type at other points on the Colorado river.

D. B. Chapin, who is making preliminary surveys for a large system of irrigation in the Devil's river territory of Western Texas, and has the promotion of the scheme well advanced, will construct one or more large dams across Devil's river at a cost of about \$1,000,000. He will carry the water through canals to the level stretch of country in the vicinity of Spofford, where it will be used to water a vast area of land of great natural richness. An enormous quantity of cement will be required in the concrete construction that will enter into the building of the dams, flumes and other parts of this proposed irrigation system.

Another project that is as large in its scope as that which Mr. Chapin is promoting is also on foot in the Devil's river section. A syndicate of wealthy Mississippi men are back of this scheme. They

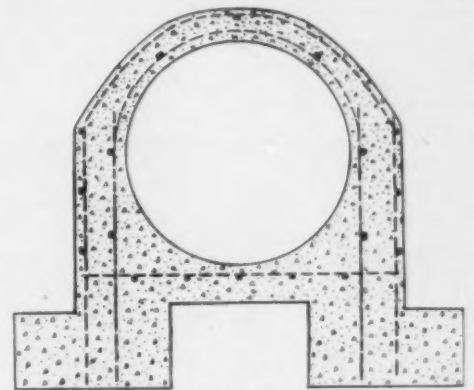
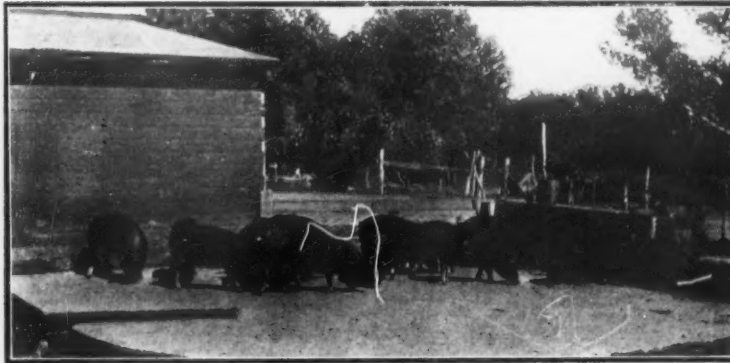


FIG. 11.

have a large corps of engineers at work running surveys and making estimates of the feasibility and probable cost of the enterprise. It is also the plan of this syndicate to construct dams of reinforced concrete to form water storage reservoirs.

# CONCRETE FEEDING FLOORS FOR FARMS



CONCRETE FLOORS ARE SANITARY AND DURABLE.



CONCRETE FLOOR IN DAIRY YARD.

The saving principle of feeding floors has long been recognized by successful breeders and feeders of live stock. The trouble heretofore has been to obtain an entirely satisfactory material for floor construction.

Wooden floors kept the feed out of the mud and dust and not only saved every particle of grain, but also prevented wheezing coughs and otherwise temporarily improved the health of the animal. However, in a short time the best wooden floors rotted-out and became infected with disease germs. Often floors had to be burned to free the farm of hog cholera.

In concrete the farmer and ranchman have found an ideal floor material. Such floors not only effect a saving in feed, a shortening in the time of fattening and a decrease in labor, but also afford perfect protection to the health of the animal. Concrete floors do not soak up water, and therefore cannot become infected with disease germs. Their surfaces can be easily cleaned and thoroughly disinfected with oils and dips. Rats cannot nest under them. Careful tests have shown that concrete floors, through the saving of grain and manure alone, pay for themselves in the short period of one year.

Feeding floors are merely several sidewalks laid side by side, and the same general rules of construction apply to them. Choose a site in the lot where the ground is slightly sloping, well drained and wind-protected, and convenient to feed and water.

Excavate to a depth of 12 inches for the drainage foundation, and around the outside edges of the entire floor dig a trench 12 inches wide and 18 inches deep. (This trench, filled with concrete, prevents hog wallows from undermining the floor and keeps the rats from nesting under it.) Fill all of this space (except the trench) to the natural ground level with well tamped, coarse gravel, crushed rock, tile culls or brickbats. This fill forms the drainage foundation as for sidewalks.

The floor must be graded or sloped so that water will not collect on it in the winter and so that the manure washings may be caught by the gutters and run to the water-tight concrete manure pit. (To shape the gutter, make a mold or templet by rounding the corners on the flat side of a 6-foot length of 4 by 6-inch timber.) A gentle slope, toward the low corner, of  $\frac{1}{4}$  to  $\frac{1}{2}$  of an inch for each foot of length or width is sufficient. This is secured by the use of a heavy grade stake at each corner of the floor, a straight-edge or a grade line, and a spirit level.

It is an advantage to have a feeding floor its full thickness above ground. Make light floors 4 inches and floors subject to heavy loads 6 inches thick. For the forms use 2-inch lumber of a width equal to the floor thickness. Begin on a low side of the floor. Mark the grade height of each corner stake and set the forms to a grade cord stretched from stake to stake. Use only good materials and mix the concrete 1 part Portland cement to  $2\frac{1}{2}$  parts sand to 5 parts screened gravel or crushed rock, or 1 part Portland cement to 5 parts bank-run gravel. Measure the materials exactly: count 1 sack of cement equal to 1 cubic foot.

## Placing the Concrete.

Always begin placing the concrete on the low side of the floor, so that the rain from sudden showers will not run from the hard onto the newly placed concrete. Fill the trench and the slab section of the forms with concrete. Bring the surface to grade by drawing over it a straight edge with its ends on the opposite forms or with one end on the form and

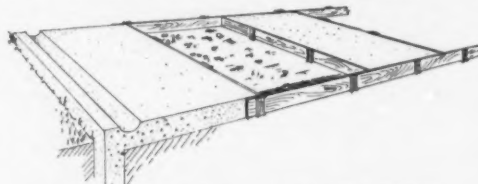
the other on the finished concrete. Four inches in from the edge, on each of the low sides, temporarily imbed the rounded 4 by 6-inch gutter mold and tamp it down until its square top is even with the surface of the slab section of the floor. Remove the mold and finish the surface with a wooden float. The day after the concrete in each section is placed, carefully throw on a covering of hay or straw, and keep it thoroughly wet for a week. Connect the gutters with the manure pit by means of a trough, another gutter, or by large drain tile laid underground. (See later article on manure pits and cisterns.) If concrete feeding troughs and racks are to be built at some future time, make the necessary mortises by temporarily imbedding beveled blocks or wooden frames in the soft concrete.

Below is given an itemized bill of materials necessary for a 6-inch floor 24 by 36 feet, amply large to accommodate 50 hogs.

## Materials Required.

Crushed rock or screened gravel, 20 cubic yards, at \$1.10.....	\$ 22.00
Sand, 10 cubic yards, at \$1.00.....	10.00
Portland cement, 28 barrels, at \$2.50.....	70.00
	<b>\$102.00</b>

Mixing the concrete by hand, 5 men can usually finish this floor in two days. Prices of materials vary



SHOWING METHOD OF CONSTRUCTION.

greatly in different localities. The figures given above are safe; but, before deciding as to what your own floor will cost you, consult local dealers. Depending upon price of labor and materials and the thickness of the concrete, the floor will cost 6 to 12 cents for each square foot of surface.

## Concrete Barnyards.

The advantages of concrete feeding floors so appealed to the farmers who first built them that they enlarged the floors until their entire barnyards were surfaced with concrete.

It is no uncommon sight in the spring and winter to see an earthen barn lot so deep with mud that animals go thirsty rather than attempt a trip to the water trough.

The effect is bad on all kinds of livestock, especially on fattening animals and dairy cattle. "Feeders" must have an abundance of water to fatten quickly. Insufficient water cuts down the quantity of milk given by dairy cows. Lack of enough exercise further decreases the yield. An occasional trip through this mud to the trough so cakes the cows' udders with dirt that the milker wastes valuable time in washing them—and they must be washed if one would have clean, wholesome milk. Continual tracking through the mud not only makes more currying, but often produces that irritation on horses' legs known as "scratches." Suddenly frozen, such an earthen lot is so rough that it is impassable. Moreover, the old barnyard—with its surface worked up year after year—becomes a storage place, which carries over the disease germs

from one season to another. The "droppings" are entirely lost, and, mixed with the earth, tend to make the lot muddier the following year. To keep up the fertility of the soil, all the manure produced on a farm should be saved and returned to the fields.

A concrete barnyard makes a fine exercise lot in all kinds of weather and always affords a dry spot for the animal's bed. Every shower washes the surface clean and flushes the droppings into the manure pits. Concrete yards lighten the work of the housewife, as there is no mud to be tracked on the walks and kitchen floor. The use of rubber boots is unnecessary. On concrete floors not a particle of grain need be wasted. The way to the water trough is always dry, smooth and passable. Concrete floors promote and protect the health of farm animals and increase the profits of farming, stock raising and dairying.

The construction of concrete barnyards is exactly like that of feeding floors, except that the work is on a larger scale. Often the entire lot is not paved in one season, but from year to year as the farmer has time. In excavating for the drainage foundation, be careful to remove all manure and straw which may be tramped into the ground and which may be so solid as to resemble earth. In time any kind of manure decays, shrinks, causes the floor to settle and forms water and ice pockets on its surface. Dig the trench for the foundation apron as for feeding floors—there is no material so rat-proof as concrete.

With the drainage foundation ready, set the forms in the same manner as for a sidewalk. Even if the whole lot is not to be paved at one time, plan the grading for the entire barnyard so that the completed pavement may have perfect surface drainage. Build and cure the pavement and make provision for saving the manure the same as for concrete feeding floors. Do not be too particular about giving the surface a smooth finish—a rougher finish affords the animals a better footing. The cost per square foot is no more than that of feeding floors—the investment yields even a greater profit.

The Columbia Cement Shingle & Tile Company of Reading, Ohio, has been incorporated with capital stock of \$10,000. The incorporators are Michael G. Roth, John Mueller, Albert Emlinger, Jr., Louisa Roth and Herbert H. Mueller.

The firm of Frank Dabelstein Sons of Chicago has been incorporated, with capital stock of \$2,000 to do mason contracting. The incorporators are Henry and Frank Dabelstein and Charles Schilling.

The Buser Construction Company of Mt. Morris, Ill., is erecting a new building in which cement blocks will be manufactured.

The Raymond Tile and Concrete Company of Raymond, Ill., has begun the manufacture of concrete silos. This company, which began business about two years ago, is one of the largest manufacturers of the larger sizes of concrete drain tile and has captured some of the choicest contracts in Illinois, taking the business from the heart of the clay-tile districts.

# CONCRETE DAM FOR PAPER MILL

A reinforced concrete paper mill, dam, forebays, and flumes have recently been completed on the Androscoggin River near Brunswick, Me., by the Aberthaw Construction Co., of Boston, for the Cabot Manufacturing Co., who have leased the properties to the Pejepscot Paper Mill for a long term of years. The mill is on the Topsham side of the Cabot Manufacturing Co.'s dam and was designed primarily to utilize the waste flow of water during periods when the river is high and at night time. The old plant, located on the west bank of the river, uses a timber dam closing off the flow between two high rock abutments that here border the stream and the new development has provided the passage for the water behind the rock abutment on the east bank.

The river bed is of solid granite and in the construction of this work it was necessary to erect two coffer dams at different levels enclosing about 106,000 square feet. About 4223 yards of rock were excavated and the construction company planned the work in such a manner that the stone as blasted was crushed and used in the concrete work, thereby eliminating the necessity of bringing stone from another source.

The general arrangement of the construction plant consisted of one derrick located at the point

forcing consists of  $\frac{7}{8}$ -inch bars generally 12 inches on centers.

The fill in back of this retaining wall consists of about 3,000 yards of silt which, by an ingenious hydraulic sluicing arrangement, was brought from the river bed up the stream and then carefully puddled and tamped. A 50-foot derrick with an orange peel bucket raised the earth from the river bed to a slanting hopper located on a wooden tower about 25 feet high. Discharging horizontally against this slanting face were about twelve 2-inch water pipes all connected to a 6-inch supply which ran across and above the hopper and connected with a motor driven centrifugal pump located on the ground directly beside the tower and with a 6-inch suction to the river. The hopper opened into the sluice down which the silt was carried by gravity to the front of the retaining wall. The cost of this fill exclusive of the cost of the plant was nine cents per yard. The outlay on the plant was \$630 and this would have been the same if the fill had been many times larger instead of only about 3,000 yards.

The mill itself is a building 116½ feet by 112 feet 8 inches and with the exception of the one story brick superstructure is entirely of reinforced concrete of proportions generally 1, 2, 4. The head gate platform in front of the mill is 32 feet by 113 feet, with the gates ahead of the racks which are protected by a concrete fender wall 23 feet deep. There are five flumes in all. Four of these have two gates each with openings 8½ feet by 14½ feet and are 59 feet long by 20 feet wide and 15 feet deep. The fifth flume is 127 feet long of the same section but has three gates. Each forebay is about 19 feet wide and 32 feet deep.

Each of the four smaller flumes contains three pairs of 35-inch Victor turbines developing 1,370 horsepower per unit under a twenty foot head. These do not drive anything but the grinders, three to a unit. A pair of 35-inch wheels is located in the long fifth flume, which is used for power purposes. The waste spaces at the ends of the flumes are utilized for white water tanks. Running at right angles to the flume walls are three tail races 88 feet long with a section 18 feet by 20 feet.

As to the equipment, it may be said that at the present time it is planned to install twelve grinders and seven wet machines. Over the flumes and back of the forebay is located the wet machine room 68 feet 4 inches by 110 feet, with a roof of yellow pine plank covered with tar and gravel and supported at the middle by four 10-inch square pine posts running lengthwise with wooden trusses on either side. On the same level and situated over the long flume is the wood room 44½ feet by 21 feet. Directly in front of the flumes and 14 feet below the floor of the wet room is the grinder room, 44 feet 6 inches by 87 feet, with a stock chest 10 feet deep underneath. In this room steel trusses support the roof 31 feet above the floor. The windows in the mill are abundant, while skylights have also been provided.

A railroad siding has been constructed from the Lewiston branch of the Maine Central railroad to the mill, a distance of 3,000 feet. This siding extends somewhat beyond the mill and will be used not only for the pulp mill, but the teams from the paper mill in the future will haul to and from this siding instead of making the long haul to the Brunswick freight yard, thus effecting a large saving in time and teams.

This entire work was designed by I. W. Jones, engineer, of Milton, N. H. The inspector was Freeman R. Preble. With the exception of the superstructure of brick, erected by Charles E. Hacher, of Brunswick, the entire contract was executed by the Aberthaw Construction Company, of Boston, Mass.

## UNIQUE RESERVOIR.

One of the most unique water reservoirs in the country, of modern concrete construction, is now being built by the inmates of the Indiana State Reformatory, in Jeffersonville, Ind., just across the Ohio river from the Gateway City. The big tank, which will afford a storage and softening basin for water used in the penitentiary, has a capacity of 500,000 gallons and is being constructed

entirely with the state's materials, concrete mix being obtained from raw material produced on land owned by the commonwealth and convict labor being employed in making the reservoir. A big force of inmates is now at work, rushing the surfacing of the basin to completion and when the tank is ready to hold water a covering of concrete one foot thick will be laid. P. N. C. Condra is the prison supervisor in charge of the work and valuable instruction in concreting is given to the inmates who wish to learn a new trade.

## DETROIT CEMENT NEWS.

Detroit, Mich., May 18.—There has been a marked improvement in the demand for cement during the past month and plants in Detroit and different parts of Michigan are operating strong. The improvement in general building circles is largely responsible for the increased demand, although there is also a good market among the paving contractors. Large stocks of cement have been disposed of during the period and quotations are slightly in advance of what they were this time last year. During the winter some Michigan cement plants had difficulty in keeping wheels moving because of the trouble in getting coal into the state. The inadequate railroad facilities were responsible and Michigan manufacturers have started on a determined campaign for better shipping facilities. The Detroit Board of Commerce is one prominent and weighty body that has started with the work and an appeal has been carried to the Pennsylvania Railroad Company for an entrance into Michigan via Detroit. It is figured if the Pennsylvania system could be induced to enter the state there would be an increased desire on the part of railroads already operating here to give better service, and it would also mean that new direct shipping points would be opened to Detroit and Michigan manufacturers.

The Wyandotte Portland Cement Company reports that its plant is running strong and the probabilities are that it will continue so through the remainder of the summer. This firm has been turning out considerable quantities of cement during the past few months, and officials of the concern report themselves as being perfectly satisfied with conditions and prospects.

The Aetna Portland Cement Company reports a good contracting business going on in Detroit and the surrounding territory, and the firm anticipates even improved business.

The Otis Cement Construction Company has been working steadily for months and will continue to do so according to statements of firm members.

The Wabash Portland Cement Company agrees with the report of the Otis Cement Construction Company, and the firm expects the good building season to continue through 1913.

The Michigan Portland Cement Company, with offices in the Penobscot building, is satisfied with conditions.

Henry Houghton & Sons have been doing considerable contracting business in and around Detroit and they report much more business in sight and that they are working behind orders—this because of the late spring.

Mayor James Gayle, of Carrollton, Ky., promoted the formation of a concrete block manufacturing company in that city a short time ago and the new concern has established its plant, which is of the most approved type. The Gayle-Calvert Company, in which Mayor Gayle is associated with Harvey T. Calvert and William Raney, is now operating a plant for concrete blocks with a capacity of about 25,000 blocks per day.

One of the biggest concrete working contracts awarded in the vicinity of Nicholasville, Ky., for some time was given last week to Eugene Monohan, of that city. Mr. Monohan is now working upon the reconstruction of two concrete distillery buildings into one at Curley, Ky., near Nicholasville. The job requires about 13,000 cubic feet of concrete, as the two structures are to be combined and in addition two new fermenting rooms 50'x100' in dimension are to be erected and a 2-story boiler room, 50'x44', is to be constructed. Work upon the contract is now under way and will be rushed to completion.

The Raymond Concrete Pile Company, of New York and Chicago, has been awarded the contract for placing the concrete piles for the foundations of improvements to the plant of the American Stopper Company, at Dwight and Verona streets, Brooklyn, N. Y.; N. M. Lacey, engineer.



GENERAL VIEW OF DAM.

of excavation and one at the stone crusher, both connected by two industrial tracks running on trestles which were shifted in accordance with the location of the blasting. The former derrick lifted the skips filled with rock onto flat cars while the latter took them off and dumped them in the pile from which the stone reached the crusher by a conveyor. Below the crusher was the concrete mixer discharging into the cars that were carried to the various points of work on an industrial track.

The sectional ogee type dam, which extends from a ledge in the river to an abutment on the river side of the mill is constructed of concrete of proportions 1, 2½, 5 with 30 per cent of the excavated rock embedded and is 135 feet long, 27 feet wide at the base and 7 feet 5½ inches wide at the top, which is 20 feet above tail water elevation. The upstream face is vertical; the downstream face forms an angle of about 32 degrees, with the perpendicular and with an 8-foot arc is swung into the horizontal upper edge of the toe, which, like the upstream face, is keyed into the solid rock. As the slope of the ledge is generally about 30 degrees, the height of the dam increases as it approaches the abutment, the top of which is 12 feet above the crest of the dam and about 51 feet from the bottom of the river on the tail race side of the mill.

The wing retaining wall, located on the shore side of the mill is about 85 feet long and its top is at the same elevation as the abutment. It is of the cantilever type and as it extends towards the rising shore its height, width and general dimensions decrease proportionally. At its largest section the base which is set about 3 feet in the rock, is 16 feet wide, while at the smallest it is 10 feet. In the vertical face there is reinforcing by one-half inch square bars, the spacing increasing from 4 inches at the bottom to 12 inches at the top in the highest section, and from 7 inches to 12 inches in the lowest. The bars are set 2 inches below the outer surface. In the base similarly placed rein-

# Concrete

## National Association of Cement Users

Meets Annually.

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C. W. Boynton, Chicago—Roadway, Sidewalks and Floors.  
L. C. Wason, Boston—Treatment of Concrete Surfaces.  
R. P. Miller, New York—Fire-proofing.  
Robert A. Cummings, Pittsburg, Pa.—Measuring Concrete.  
Peter Gillespie, Toronto, Canada—Nomenclature.  
Sanford E. Thompson, Newton Highlands, Mass.—Specifica-  
tions and Methods of Tests for Concrete Materials.  
Logan Waller Page, Washington D. C.—Education.

### CONCRETE PILES USED IN SPRINGFIELD.

Concrete piles are now being used in the foundation work for the new Big Four passenger station at Springfield, Ohio. They are driven into the earth with just the same method as wooden piles, to a depth from 17 to 26 feet and without boring a hole in the earth. As there are about 220 of these piles to be placed, the driving will consume considerable time. After the piles are all in place the American Concrete Company will begin laying the foundation for the station. P. M. Louwers and W. S. Hazelton, connected with the American Concrete Company, in Chicago, were there to see the work started.

### CONCRETE TOWN TO BE BUILT.

Announcement is made that a new town is to be added to the map, between Houston and Galveston. The houses are to be built of poured concrete, built by patent machinery and put up in a very short time. A contract has been signed with a San Francisco cement construction firm by C. A. Elmer & Co., of Houston, for the building of the cement homes. Sand from the San Jacinto river and shell from the shell banks in Galveston Bay are to be used in making the concrete.

### SAN FRANCISCO CONCRETE NEWS.

Unusual activity is noted in San Francisco in concrete work of all classes, from the largest to the smallest. In the former class may be mentioned the large dams of the Great Western Power Company near Big Meadows, Cal., and another dam of the Pacific Gas & Electric Company. A number of concrete bridges and wharves are also under way. The surveyor of Alameda County has prepared plans for a \$75,000 concrete bridge over Alameda Creek at Niles, to replace the wooden bridge washed away in the winter of 1911, and work will be started in a few weeks. There is an enormous amount of sidewalk work in outside towns, and concrete pipe is being largely used in irrigation and drainage work.

A new concrete pipe irrigation system on the Monoeville, Cal., irrigation project was given a thorough test recently by the engineers, under the Sacramento Valley Irrigation Company, and proved a great success, water being sent through the pipes under high pressure. This is one of the most highly developed irrigation outfits in the state. All the pipes are underground, doing away entirely with surface ditches.

The use of concrete street curbing in certain districts of San Francisco, to be defined by ordinance, was recommended a few days ago by the street committee of the supervisors. The matter was brought up by the people of certain residence districts, who objected to the high cost of the granite curbing formerly required.

The city of Penticton, B. C., recently received bids for the manufacture and laying of about seven miles of 18-inch concrete pipe.

### MEMPHIS CONCRETE ITEMS.

Memphis, Tenn., May 11.—Dealers around town report that on account of the overflows in territory west of here across the river, the blockading

of traffic and general adverse conditions, that there has been some little interruption in building activity, though a good deal of work is in prospect. Also that the cement market is much cut to pieces from the standpoint of prices.

Steve Wright, of the Wright Lime and Cement Company, said that the outlook for business was very good, but that the market was cut up a good deal and things yet remained problematical for the summer.

W. W. Fischer, of the Fischer Lime and Cement Company, was on one of the tickets of the friendly contest between the Red and Blue for the directorate of Business Men's Club. He came out all right.

Kaucher-Hodges Company, Exchange Bldg., are the engineers for a reinforced concrete building Home for Incurables under erection on Magnolia street.

Architects Harker and Cairns have planned a reinforced concrete opera house for one of the Northern Mississippi towns.

The Memphis Granolith Company reports a good deal of block work for foundations on hand, also vault and porch column work. The plant is being overhauled extensively. New curing rooms and mixers being placed. Lehigh cement is being utilized.

The city of Memphis has a great deal of paving work going on at this time.

Harris McAdoo and Dodson, at Union City, Tenn., are doing considerable concrete work this season. They have the contract for the basement on the Morgan-Verhine business house; also a stucco and concrete residence for Mrs. Fope Hearing.

Geo. W. Stiles Contracting Company, Rookery Bldg., Chicago, have the contract for the \$50,000 government building at Union City.

### PITTSBURGH CONCRETE NOTES.

There is more public work that will make necessary big concrete contracts than ever before. The Point Bridge project is only one of many government jobs on the rivers which are coming forward this year. The street railway work, removal of the Hump and the large amount of warehouse building in Greater Pittsburgh are making an enormous sale for concrete and cement products and engineers in this line are busier than they were last year. In spite of a few accidents that have occurred, concrete building is becoming more popular every week and, when properly reinforced, is regarded by engineers and architects here as a big economy in money and a mighty substantial way of building.

The Lehigh Portland Cement Company, formerly located at New Castle, Pa., has transferred its sales office to the First National Bank Bldg., Pittsburgh, where H. C. Hutson is in charge.

The Raymond Concrete Pile Co., through its Pittsburgh office, has secured the contract for the concrete piles for the foundations of St. Martin's Roman Catholic church at Steuben and Alexander streets.

The Manufacturers and Contractors' Club at a recent meeting took up the matter of appointing a commission to revise the building laws of Pennsylvania. The local committee appointed has confined its work to reinforced concrete in building construction and recommends a number of changes for the commission to consider. At one of the club's April meetings, S. G. Webb, manager of the Development Department of the U. S. Gypsum Company of Chicago, spoke of fireproof construction.

The P. R. R. has asked bids on a reinforced concrete wall, 3,000 feet long and eight feet high, along its right of way in Ohio street, Northside. The estimated cost is \$45,000.

Pihl & Miller have the contract for the concrete walls for a large warehouse to be built by the Pittsburgh Valve, Foundry & Construction Company on 26th street. The same engineers are preparing plans for a building of concrete construction for the Ladies' G. A. R. at Hawks, Pa. They also have plans for a reinforced concrete bridge over the P. R. R. at Swissvale, Pa.

Irvin & Witherow are engineers for the six-story warehouse which the George A. Kelly Company, wholesale druggists, will build at once at Ninth street and Duquesne Way. The construction will be of reinforced concrete.

### LOUISVILLE CONCRETE NEWS.

Louisville, Ky., March 18.—The year has already provided a number of interesting features in concrete engineering in Louisville and surrounding territory. Owing to unfavorable weather conditions, the furtherance of various projects has not progressed to any extent in the past few weeks, but with permanent improvement in the only undesirable feature that exists, rapid execution of several big enterprises should follow during the summer.

Actual construction of the new City Hospital in Louisville has begun. A short time ago the Hospital Commission awarded to A. Bentley & Son, well-known contractors of Toledo, O., the contract for the erection of the institution. The Bentley bid for the work approximated \$600,000, a sum which will leave a comfortable surplus from the \$1,000,000 municipal bond issue for the extensive equipment and initial maintenance of the hospital.

The Louisville Railway Company is preparing, within the next eighteen months, to lay a strip of concrete approximately seven miles long, 15 inches thick and 10 feet wide. The work will naturally consume thousands of barrels of cement and provides an interesting feature of the local construction field. The railway job will be a road-bed for the cross-town car-line which was recently allowed in a municipal ordinance and which the railway company has decided to erect and operate for the purpose of affording traction facilities through the southern residential portion of the city. It extends from the extreme southeastern to the extreme southwestern suburb of Louisville, a distance of about seven miles. The company is laying all new track upon a concrete foundation, and is advocating the use of steel ties, thereby making its right-of-way properties practically perpetual. The cross-town line will be constructed by the company's road gangs, and will require a considerable space of time to complete, although it is the purpose of the backers to push work as rapidly as possible immediately after warm weather opens.

The Ohio River Contract Company is progressing rapidly with its work of widening the head of the Louisville & Portland Canal, a water-way owned and maintained by the Government. The company is proceeding with tens of thousands of feet of excavation along the upper end of the canal and will gradually work up and down the Ohio completing inland waterway improvements which have been ratified by the Federal authorities. The Lehigh Portland Cement Company is furnishing about 15,000 barrels of its product per annum to the contractors for use in the concrete improvements and interesting engineering problems are involved in the work. It is expected that four or five years will be required to conclude the operations of the contract company, making the total consumption of cement between 60,000 and 75,000 barrels, composing hundreds of thousands of square feet of abutments and dams.

Representative Sam L. Robertson, legislator from the Eleventh District of Kentucky, well-known concrete worker and all-around business man, has returned from Frankfort, Ky., where he attended the 60-day 1912 session of the General Assembly.

Now that he is freed of Legislative duties, the West End concrete worker is preparing for activity in his regular line.

G. W. Younger & Company, well-known paving contractors, with headquarters in the Paul Jones Building, are beginning work upon one of the heaviest schedules of concrete paving work in the history of the concern. Mr. Younger has devised a plan of payment for work of this nature which is securing more business for his company every week. The contractors are soliciting, through newspaper ads and direct approach of prospective patrons, all the paving work which they can procure, with the agreement that it is to be paid for in installments if the owner so desires. A special form of contract, allowing for settlement of the job within six months' time after it is completed, in periodic payments, has been prepared and is effecting the award of lots of business which would otherwise be unattainable because of the unfounded fear of property-owners that modern improvements demand too great an initial investment.

The National Concrete Construction Company, of this city, is handling an unusually large amount of early season work. The prime topic of prospective interest with the National company at present is the erection of the new \$300,000 home of the Young Men's Christian Association in Louisville. This structure will be 8 stories in height, located on the corner of Third Avenue and Broadway, and should be begun in the near future, as bids on the work will be opened some time next month.

The National company is now handling some important railroad work in the South. Three or four small concrete and steel bridges, a number of bridges and some other work in the way of culverts and drains is being rushed along in the vicinity of Bangor, Ala.

The Central Concrete Construction Company is starting full steam ahead after winter quietude. The company possesses better prospects than at any corresponding time in its history, according to report. The concrete and brick Arcade store building at Third Avenue and Walnut Street, which is being erected by the Central force, is almost completed, and the block plant of the concern has been started for a busy spring and summer term.



## Association of American Portland Cement Manufacturers

Meets Semi-Annually.

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Executive Committee

### WHITE PORTLAND CEMENT.

White Portland cement is one of the specialized forms of the industry and it adapts itself for many beautiful creations. While it presents a beautiful aspect for exteriors, it is especially adapted for permanent work on interiors, for stairway, balusters, fancy moldings, statuary, niches in walls and many other forms where a pure white is desirable. The market for white cement is steadily increasing and it commands a good price. As a material for the creating of highly artistic work, it has no superior. It commands a higher price than the standard grade of Portland cement and will continue to do so, and its increased use is only a matter of increased production, for there ought to be a market for every barrel produced.

### CEMENT PRODUCTION.

The Bureau of Statistics of the Department of Commerce and Labor shows some interesting changes in the United States statistics relating to cement production, consumption and exportation. The above are all increases and in this connection the importation shows a remarkable decline. The production of cement grew from 8,000,000 barrels in 1890 to 73,000,000 in 1910, while the value of the production increased from \$6,000,000 in 1890 to \$69,000,000 in 1910. The quantity of cement exported in 1900 was 76,055 barrels (380 pounds each), valued at \$163,162, and in 1911, 2,971,474 barrels, valued at \$4,294,290; the figures for the nine months ending in March indicate that the exports for the fiscal year of 1912 will considerably exceed in value and quantity those of 1911. The estimate is 3,000,000 barrels, or 40 times the business of 1900. The approximate value is \$5,000,000 as compared to \$163,162 in 1900.

The quantity of cement imported in 1907 was 1,123,763,604 pounds, and fell in 1911 to 93,297,749 pounds and it is believed will not exceed 50,000,000 pounds for the fiscal year of 1912.

The United States is now the leading producer of cement, with Germany second and England third. A very large proportion was consumed at home, the figures indicating the use of 74,000,000 barrels in 1910. The cement in question is known as Portland cement and Pennsylvania is the largest producer in this country, turning out about one-third of the total. The state next in order are: Indiana, Kansas, Illinois, Missouri, New Jersey, Michigan and New York. The cement industry includes some 135 establishments with an invested capital of \$187,398,000; number of employees is 26,675; wages paid, \$15,320,000; cost of materials, \$29,344,000; value of products, \$63,205,000.

Panama takes over 65 per cent of the cement exported from the United States.

### HANDLING CEMENT.

A new departure in the cement industry developed this month when the Atlas Transportation Company started on its first trip up the Mississippi with a steamer and five large barges loaded to the gunwales with Atlas Portland Cement from the great Hannibal plant. Progressive as is this big concern, one not connected with the cement trade would not imagine the strides they have made in the last few years that brings them to the organization of their own fleet of river boats.

Everyone knows cement is being used in large quantities, and train loads leave the mills every day for all parts of the country to supply the cement workers with the material used so extensively for so many of our everyday needs, but it has again been left to the "Atlas" people to mark a new era in the history of cement by conducting a transportation line of their own on the Mississippi.

This line will run up the river as far as St. Paul, and down the river to New Orleans, and have connecting lines for both the Ohio and Missouri Rivers. The large steamer "Josh Cook," flagship of the fleet, will tow a string of barges, leaving one at each distributing point on the way up or down the river. Atlas dealers will get their supply direct from these barges, and the steamer will pick up the empty barges on her return trip to Hannibal, where they will immediately refill, ready for the next trip.

The Keokuk dam, on which the Atlas Portland Cement Company is furnishing about one million barrels of cement, and second only in importance to the Panama Canal in size, is being furnished cement by the Hannibal plant, while all the cement for Panama is being shipped from their mills located at Northampton, Pa.

### LOUISVILLE CEMENT NEWS.

Louisville, Ky., May 18.—The cement trade in Kentucky is prospering, and its prosperity is just as general as it could be with any local industry which might cater to a trade extending throughout most of the country. It is conceded throughout the Bluegrass contingent that cement is in fine demand and that, furthermore, the market is more stable than it has been at this time of the year for several years.

The outlook for the year at large is satisfactory. The prospective influence of the presidential election does not appear to be threatening with builders or allied tradesmen. It seems that the 1912 building boom, which was forecasted last year, is due to be of just as much strength throughout the country as though the undeniably unfavorable influences of a backward spring, late crops and the coming political contest were unknown.

There has not been any very perceptible improvement in prices in the Louisville cement trade during the month, but this feature was scarcely expected. The market has taken on that indefinable quantity known as tone, the resultant of brisk demand and even supplies, and complaints are unknown even though prices remain at practically the same level as heretofore.

J. B. Speed & Co., favored by fine weather for manufacturing purposes and a strong current of demand, are prospering. The major job of the well-known local company at present is that of furnishing cement to the new City Hospital, which is being erected in this city at a cost of nearly \$1,000,000. Several thousand barrels of Speed's Portland cement will be consumed in the work of erecting eleven buildings, which will comprise the municipal institution and the delivery work in this one piece of work will extend pretty nearly throughout the summer. The outlook, as forecast by J. B. Speed & Co., is uniformly pleasing.

No further news of the pending reorganization of the Kosmos Portland Cement Company, of Louisville, is forthcoming just at present. It was announced some time ago that a deal is now being negotiated whereby local interests will take over the extensive holdings of Samuel Horner, the Philadelphia millionaire, in the company. When this transaction is completed the properties of the concern, at Kosmosdale, Ky., will be materially improved to result in doubled capacity for them and operations will proceed upon more advanced lines than ever.

The Kosmos Portland Cement Company, according to its report, is as busy as it can be. For the past month the mills of the company, a few miles out of Louisville on the Illinois Central division to Central City, Ky., have not lost an hour's time, and there is no prospect for a let-down in activity during the remainder of the summer.

The condition of Charles Horner, of Philadelphia, Pa., secretary-treasurer of the Kosmos Portland Cement Company, is reported to be greatly improved, although Mr. Horner has not yet become sufficiently strong to leave his residence. About a month ago the young Philadelphian was stricken with serious internal trouble, which forced him to leave Louisville at once for his home in the East. A period of absolute rest has afforded wonderful recuperative benefits for him in his weakened condition and it is stated that he will be able to be about before long. Mr. Horner is to marry Miss Fannie Ballard, one of the prettiest and most popular girls in Louisville, in the near future.

An echo of the hydraulic cement boom in Clark

County, Indiana, just across the Ohio River from Louisville, was recalled a short time ago when the New Albany Cement Company, at New Albany, brought suit against Sarah T. Piercey and a number of others to enforce the transfer of a deed to certain lands which was executed many years ago but was never legally closed. About twenty years ago land in Clark County was sold at fabulous prices, for it was said to be invaluable in the production of hydraulic cement. The husband of Mrs. Piercey disposed of a parcel of land to the New Albany Cement Company, which was then formed, for a consideration of \$10,000, payable in \$100 shares of stock in the company. This transaction was never duly completed through the enforcement of the deed to the land, and the cement company is now bringing suit to reclaim its possession, although the property involved is valuable for nothing but every-day farming because of the growth of the Portland cement industry.

The newest and one of the biggest cement producing concerns in Kentucky has just been organized by well-known capitalists of Baltimore, Md. The new company is known as the Kentucky Portland Cement & Coal Company, and is incorporated with a capitalization of \$1,200,000 in common stock, and an equal amount in bonds. It has purchased a valuable tract of coal and cement lands near Pineville, Ky., and is preparing to install a \$900,000 cement milling and coal mining plant. The main offices of the company, from which all business connected therewith is being transacted at present, are in Suite 1025 Munsey Building, Baltimore, Md. The Kentucky Portland Cement & Coal Company proposes to get under way as soon as possible. It possesses valuable natural advantages in Pineville and bids fair to become a permanent institution in the Southern cement industry. Its officers were recently chosen as follows: President, Emory M. Newton, 1025 Munsey Building, Baltimore, Md.; Vice-President, Robert S. Maslin, 200 Maryland Trust Building, Baltimore; Secretary, William M. Haworth, 1025 Munsey Building, Baltimore; Treasurer, Harry J. Matthews, Fleet and Albermarle streets, Baltimore; Engineer and General Superintendent in charge of construction, John W. Dreisbach, 1025 Munsey Building, Baltimore.

### Louisville Retailers.

Louisville, Ky., May 18.—A short period of sunny weather, which now promises to hold good for the remainder of the summer, has produced greater activity in the building supply trade in this territory than any other one factor could possibly have developed. Good building weather was just what the allied trades were waiting for, inasmuch as operations in the Falls Cities were restrained to a minimum during March and April, two months which would normally be productive of the first signs of the building boom which is scheduled for this year.

At that, the prospective boom exists just as certainly as before. The report of Building Inspector Robert J. Tilford for April indicates that this period developed considerably more building in Louisville than the corresponding term the preceding year. Last month a total of 290 permits were issued for work which will aggregate \$702,403 in cost. During April, 1911, a total of 287 permits were granted for buildings to cost approximately \$523,998. Thus far in the fiscal year 1,403 permits have been issued for work which amounts to \$3,649,000 as a whole. These records indicate that the fiscal year 1911-12 is already well in advance of the 1910-11 term, which in itself was a record-breaker.

Th marked stimulus produced in local building during the past month is attributable to the fact that the permit for the erection of the new home of the Young Men's Christian Association in this city was issued late in April. This structure, seven stories in height, is to stand on the northeast corner of Third avenue and Broadway. It will be of concrete and brick construction, of the most approved design throughout, and will cost about \$350,000.

Although the big jobs of the year provide the greatest item of interest for the supply trades, it is asserted that there is more residential work in hand at present than there has been for years at this time. Within a month or six weeks the dealers in roofing, paints and other supplies should be in the hey-day of one of the most prosperous seasons they have ever known.

The Louisville Builders' Exchange, an organization which embraces in its membership many of the leading supply and material retailers of the Falls Cities, has moved its headquarters from the ninth floor of the Lincoln Bank Building to the fourth floor of the Realty Building, Louisville's newest and one of her handsomest sky-scrapers. The Exchange now boasts an entire floor, sumptuous

ously fitted, in one of the finest buildings that the structural trade could wish for headquarters. When moving day was over with the members of the Exchange, a big celebration marked the christening of the new quarters. A committee composed of Chairman Alfred Struck, E. G. Heartick, George T. Cross, Gus Albrecht, Jr., Edward Wagner and Secretary Jesse M. Vollmer arranged for a delightful spread and special entertainment, to which every builder and building supply man in Louisville was cordially invited. The feature of the evening was an educational moving picture show which photographically described the processes of making roofing tin-plates, from the reduction of the ore to the finished product. A musical programme and a luncheon which will linger long in the memories of the builders topped off the occasion and the Exchange is now ensconced as one of the prime features of The Realty.

The Central Paint & Roofing Company, according to L. M. Rice, Jr., its president, is very busy at present and does not anticipate any slackening in trade for months to come. The Central company is specializing in the sale of Security brand asphalt roofing at present, and is finding that surfaced-lined stock is by far the most acceptable offering with which it has ever experimented. Beaver board is also being introduced to the Bluegrass by the Central company with great success.

The National Roofing & Supply Company, according to Vice-President Edward Streicher, is handling a greater variety of jobs of more importance than ever before at this time of the year. The season was slow in opening, said Mr. Streicher, but now that it has arrived there is plenty of work to do and roofing contracts should amplify as the warm weather extends and allows work which is now in course of construction to approach the finishing stage.

Samuel F. Troxell & Company recently landed a fine contract for furnishing the material and executing the work upon the roof of the big new warehouse which is being erected at Henderson, Ky., by the American Tobacco Company. The Henderson job is the first new one of the season for the Troxell interests, but there is a lot of work left over from last month to keep the entire force working full time.

Samuel F. Troxell, of the Samuel F. Troxell Company, recently returned from a short trip through Western Kentucky.

The season's trade in Kosmos Portland Cement is just opening with the Culley Cement Block Company, according to John S. Culley. Mr. Culley expects his receipts in this special retail line to be larger during 1912 than ever before.

#### PHILADELPHIA CEMENT NEWS.

Philadelphia, Pa., May 15.—All the cement dealers in this city and through the Lehigh Valley agree that the season is very good on a 5 and 10 cents per barrel advance over last year. Large volumes sold and actually delivered, although the total shipment is behind the year previous by about one hundred thousand barrels. The late season has considerably retarded the delivery of material.

The Whitehall Portland Cement Company, No. 1722 Land Title Building, has received contracts for more railroad work than at any season before. A big operation for the Long Island Railroad at Flushing, N. Y., requires 60,000 barrels of cement; F. H. Clements, contractor. A job for the Pennsylvania Railroad from Long Island City to the water front requires 100,000 barrels. The Delaware, Lackawanna & Western Railroad require 300,000 barrels of cement for work near Scranton, Pa. This is to be used within twelve months.

The Vulcanite Cement Company has the contract to furnish the cement for the Ritz-Carlton Hotel, now being erected at the southeast corner of Broad and Walnut streets.

The Whitehall Cement Company has the contract to furnish the material for the new Stetson Hat manufacturing plant at the corner of Fourth and Montgomery avenue. They also have a city contract to furnish 8,000 barrels of cement for the Arch street improvement. The United States Government has awarded a contract to the Whitehall company for 4,000 barrels of cement to be used on the new Immigrant Station at Gloucester, N. J.

A. R. Lewis, formerly with the Coplay Cement Company, has joined the force of the Northampton Cement Company, at Northampton, Pa., as sales manager.

Young's pier, at the foot of Tennessee avenue, Atlantic City, the largest structure for its purpose in the world, is to be rebuilt. The pier will have a convention hall with a seating capacity of 12,000, a theater with a seating capacity of 3,000 and a hotel with over 100 guest rooms, restaurants and so forth. The Whitehall Portland Cement Company has the contract to furnish 20,000 barrels of cement.

The American Cement Company of New Jersey has liabilities of \$2,650,000 in its own stock and bonds, current liabilities of \$357,105.35 and a contingent debt of \$70,000. Its assets amount to \$1,858,237.95 in stocks and bonds of subsidiary companies, \$658,000 of which has been deposited as collateral for bond issues and loans. This company has current assets of \$5,170.42. These reports were filed by Sydney W. Keith, Robert W. Lesley and John Scott, Jr., receivers of the American Cement Company and certain of its subsidiary companies coming under their supervision by reason of their appointment by the United States District Court in Philadelphia.

The General Asphalt Company, it is rumored, contemplates buying the plant of the Filbert Paving & Construction Company. This is denied by the Filbert company, which adopted a resolution at a recent meeting calling upon the stockholders of the concern to vote on a proposal for the sale of all the plants, machinery, equipment and physical property of the company. The Filbert company has been doing a great amount of city work.

The building of the Little Olney concrete bridge has been awarded to Nelson-Merydith Company on a bid of \$2,024, and the Centerport bridge on a bid of \$2,154. The Monocacy bridge in the Schuylkill Valley will be built by the Brown-King Company of Philadelphia on a bid of \$4,009.

E. P. Evans, formerly traffic manager for the American Cement Company, has entered the employ of the Whitehall Company.

If the plans for the building of the new dry dock at League Island Navy Yard go through, the United States Government will require 75,000 barrels of cement for the job. Inquiries are out concerning this material.

Directors of the Bath Portland Cement Company, alleging mismanagement, have started suit at Easton, Pa., against certain former directors to recover salaries aggregating \$20,000.

Suit against the Atlantic Portland Cement Company has been brought by the Easton Trust Company at Easton, Pa., in an effort to recover \$1,500,000 with interest from April 1, 1906, at the rate of 6 per cent. The indenture of mortgage executed by the cement company with large mills at Stockertown, Pa., is the foundation of the suit.

An eight-story concrete commercial building 60 by 140 feet, to cost \$150,000, will be erected at the corner of Hutchinson and Filbert streets, if the pending negotiations are successfully carried through for the purchase of the big factory building located on this site.

The Turner Concrete Steel Company has a contract to erect a five-story concrete factory, 62 by 86 feet, at the northeast corner of Randolph and Wood streets, for Berko Bros., at a cost of \$40,000.

Charles Camm, formerly secretary of the Giant Cement Company, is now affiliated with the Whitehall Portland Cement Company.

Charles Nagle, formerly of the Giant company, is now associated with the Lehigh Cement Company.

Gaston Daws, formerly Second Vice-President of the Giant Cement Company, is now connected with the Charles Warner Company, No. 812 Land Title Building.

The Alpha, Edison and Vulcanite companies are all working full time, while the Atlas and Lehigh companies are working only about 70 per cent of the time.

A Delaware State charter has been granted to the National Rock Products Company of New York, for the manufacturing and selling of cement, etc. It is capitalized at \$150,000. John McLearn, of New York, is the incorporator.

#### NEW YORK CEMENT NEWS.

New York, May 13.—The cement situation shows signs of improvement and the volume of business transacted during the past month was fairly satisfactory. A steady consuming demand has been noted, although the inclement weather has tended to retard the movement somewhat. It is hoped that by the time the regular spring season sets in and weather conditions warrant building operations on a larger scale that cement will once more come into its own in this market.

The situation in the producing sections is becoming more encouraging from the mill viewpoint. The recent failure of the American Cement Company and the restricted productions of other concerns have reduced stocks considerably in the Lehigh section. Prices there are now being easily maintained at 65c per barrel at the mills. In the region between Pittsburgh and Chicago it is stated that this price has not been easily maintained and it is understood that it has been shaded somewhat. The mills cannot make very much money at such prices, but they hope to keep plants running and stretch matters over until the situation improves. Lehigh stocks are gradually being worked down and this

is bound to be of ultimate benefit to the trade in general. While it is stated that the finances of some of the operating concerns are not in the finest possible shape the leading local interests do not look for any further receiverships and it is hoped that the hundred or more mills that are now left will manage to tide over until business affairs are brighter in general. Building operations of late show a marked improvement over those of the corresponding period of last year and firms catering to this trade in the East are expecting a good volume of business from now on.

Mr. Ward, of the Knickerbocker Portland Cement Company, stated: "The volume of business that transpired during the past month was good. A strong undertone was noted in the market and prices have showed a tendency to stiffen. We look for an advance of 5 cents at least by the end of June and we expect a steady demand for cement to continue throughout the balance of the spring and the summer months."

Mr. E. Meyer, of the Edison Portland Cement Company, said: "The spell of unfavorable weather has checked the demand for cement during the past two weeks. Business, however, has been fair with prices well maintained. We expect a good amount of business to materialize as the season advances."

Mr. S. Wells, of the McCormack Waterproof Portland Cement Company, added: "The demand for our waterproofing material compound was good during the past month and we have disposed of more cement during the last two months than we have for any other six months. We have made arrangements with one large Eastern mill to supply them with our goods and preparations are under way with other concerns to distribute our material. We have interested many architects and contractors and have landed a number of out-of-town jobs."

At the offices of the N. & W. J. Peck Company it was reported that the demand for their Ajax Portland cement was fairly good during the past month. Unfavorable weather conditions during the past week had a tendency to retard the market. The outlook for a steady demand is bright and with favorable weather the volume of business is bound to improve.

#### IN SAN FRANCISCO FIELD.

The latter part of April brought an unusual rush of cement from the California plants to the North Coast cities, owing to the recent announcement of an advance in freight rates on the steamers which have handled the cement shipments. The advance took effect May 1, the rate from San Francisco to Portland, Ore., being changed from \$1.37½ to \$1.50 per ton. The rush was so great that the docks at Portland were badly crowded. Since then the movement has naturally fallen off, though there is little doubt that it will be resumed before long. The rate from Los Angeles harbor is \$1.75 per ton, but little has been moved from there of late.

A movement of great importance is now under way among the cement manufacturers, having as its object an organization including all the manufacturers west of the Rocky Mountains. At a recent meeting at Seattle, Wash., informal organization was effected, and incorporation papers will soon be taken out. The permanent headquarters, according to present plans, will be in San Francisco. Some fifteen western mills are represented, and among those who have taken a prominent part in the movement are: John C. Eden, head of the Superior Portland Cement Company, Seattle, Wash.; A. F. Coats, head of the Washington Portland Cement Company; F. W. Rochester, sales manager of the same firm; F. M. Moose, of the Standard Portland Cement Company of San Francisco; F. W. Erlin and Dan R. Brown. The purpose is purely that of promotion of the use of cement. It is admitted that there is an overproduction of cement on the Coast, and the use of this material by farmers and others is not as great as it should be. Some of the manufacturers have men out to give practical demonstrations of the benefits of cement on the farm, etc., but working independently they cannot accomplish the same results as are expected from a central organization, while could carry the campaign of publicity and education to every part of the Coast.

According to a recent statement of Tyler Henshaw, general manager of the Riverside, Cal., Portland Cement Company, the plant is now turning out 5,500 barrels of cement daily. The output is now the second largest of the Coast mills, being exceeded only by the Santa Cruz Portland Cement Company, and Mr. Henshaw states that the improvements now under way or planned for the immediate future will make the output the largest on the Coast.

# FIRE PROOF VALUE OF CONCRETE

By W. B. McMaster

An agitation of the subject of saving our created resources is not complete without directing effort to the determination of the properties of building materials by some medium through which can be formed an absolutely impartial judgment.

When the committee or commission that may be formulating the building code of a city or state is pursuing its work, they are throughout their deliberations besieged and besought by salesmen and representatives of the various manufacturers of building materials, each with his evidence all built up to convince one that his material should be given preference or at least a recognition, and this a competitor may later dispute.

This competitor will apparently have a case as strong as his rival—and so the "merry war" goes on; but the men who are building the code are confused and often with all integrity back of their conclusions will take action that is the result of good "salesmanship" rather than of a presentation of facts.

Much that is offered as evidence of the fire-resisting quality of materials is not based on scientific data and, in fact, it is doubtful if absolutely unbiased conclusions in these investigations will be found except they come from tests or experiments conducted by a bureau of the government. Many of the problems now confronting insurance engineers, constructing engineers, architects, city and state governments and others would be solved were investigations to ascertain definitely and scientifically the properties of building materials, particularly as to their fire-resisting qualities, to be pursued by the bureau of standards. This bureau, with a limited appropriation at its disposal, has begun work of this sort, but as yet has not been given facilities to demonstrate the relative fire-resisting values of the different materials that go into buildings.

With delay in having this important research made by this bureau, which is the one best equipped for that work, there will be continued waste of effort and futile endeavor on the part of states and cities to fix standards.

The prime thing in favor of having the bureau of standards carry on this research is that it would undertake to learn just what various materials will do under all conditions that might be created in a conflagration and their findings would be free from prejudice as between the manufacturers of competing materials.

This matter is deserving of agitation that a sentiment shall be created which may result in this very important work being taken up by the bureau of standards and through that medium have settled for all time what materials can best be depended on to retard a fire.

This data is very much needed by those who say what shall be used in buildings and a manufacturer of building material who would object to the development of facts along the lines proposed might be suspected of a want of confidence in his material or a lack of integrity.

If this project could have the support of the several trade journals whose columns are devoted to all that will promote engineering, architecture and building construction generally, it would soon crystallize into a definite movement which should soon result in legislation and appropriations commensurate with the importance of this work.

## THE OUTSIDE SURFACE.

There are still some members of the concrete industry who pool-pool at the coating proposition, when, as a matter of fact, it is possibly the most important feature of practical concrete work. It is the thing that strikes the eye and forms the first suggestion of opinion as to favor or disfavor, for concrete when used for such fastidious operations as residences and the extensive improvements upon large estates. Long ago concrete construction has been proved out as the safest, most rigid and altogether most durable way to build every possible kind of commercial and industrial building. The beauty part for a long time was overlooked entirely, so much so that there are very many people who consider concrete as a great utility—one of the new essentials of an advanced civilization, but anything but beautiful. In fact, many people say habitually: "Concrete houses are positively ugly."

Now, nothing is further from the truth. It is impossible to find any material that lends itself so cheaply and so satisfactorily to ornamental finish. The most magnificent effects in concrete are quite as low in cost as the shabbiest embellishments in all other building materials. Coated surfaces in

a very great variety of permanent colors are quite inexpensive. Effects of lasting character can be secured in this way, such as the palace builders of the orient indulged in with the resources of vast empires at their disposal. Those things which the Pharaohs could ill afford can actually be obtained by people in very moderate circumstances, provided they have the good judgment to build with concrete, together with taste for beautiful in color and contour to select forms and colors easy to obtain.

The use of cement plasters in the treatment of exteriors in conjunction with color schemes most particularly appeals to the artistic sense. If you, gentle reader, should chance to engage an architect to design your new home, and he is insensible to your suggestions in those particulars, you can take it for sure that he is no artist gifted with originality to design a house to fit a given spot, but a mere T-square mechanic, who uses the expressionless lines of convention, which will please every one who lacks the brains to assert individuality.

Why spend the money that building must cost unless you stamp the place with your own mark of taste and character?

## FIREPROOFING VALUE OF CONCRETE.

The United States Bureau of Standards has been conducting an extensive series of tests upon fireproofing materials. The old method of giving concrete a fire test consisted of making up a number of six-inch cubes and subjecting them to very high temperatures. It is a condition which is impossible to obtain in practical experience, so the government experts decided upon the better plan of making up slabs similar to those used in the construction of buildings for the test pieces; also, the heat was applied upon one side of the slabs, the same way that fires invariably act. These valuable tests are completed and tabulated, and the results show that limestone concrete is the best obtainable fireproofing for practical use. In very few cases where high temperatures are maintained for a long time, did the effects of heating penetrate further than one inch and a half beyond the exposed surface into the slabs. The length of time required to heat the slabs to something near the danger point indicates plenty of opportunity to remove valuables of every description, for long before that point could be reached human life would be impossible. The floor above the heated slab would barely be sensibly warm from the effects of a fire immediately underneath, having as much heat producing power as ninety-nine per cent of the recorded conflagrations.

Limestone concrete has been commonly criticised by superficial observers because under kiln conditions it can be burned into lime, a spongy substance, having little tensile strength. They do not consider that it costs thousands of dollars to assemble even indifferent kiln conditions for the purpose and design of burning lime—and very often, even after spending great sums and much effort it is not effectively done.

Practically speaking, all of the danger to human life in fires and very near all of the property damage occurs far below the calcining point of limestone. Again, the particles of limestone embedded in concrete have only a small portion of their surfaces exposed to the rigor of the fire, and this is not the condition under which it will calcine or change its chemical and physical character. Protected on all sides from the friction of heated gas currents as the particle of limestone is when used in concrete, it will never calcine completely, and will not even be affected until extremely high temperatures are reached—higher, in fact, than anything of which we have official record.

One important result of the tests made at the Pittsburgh laboratories is the changing of the form of test pieces for all future fire tests of concrete. The slab tests, as worked out by the government experts, has a distinct value in determining the usefulness of concrete as a fireproofing material. All the municipal codes carrying the absolute cube tests will have to be promptly amended to conform to better intelligence.

Remember that limestone concrete intelligently designed is the best practical fireproofing yet known.

A large number of important plastering contracts have recently been let in San Francisco, among them being: Wm. Ede building, to C. C. Morehouse, \$3,383; St. Francis Convent, plaster, hard wall plaster, ornamental work, etc., to John Fay, \$4,350; Hale Bros.' department store, to Lyden & Bichel, \$27,500.

Jesse Steer is representing the local plastering trade in a movement to form a central organization in San Francisco of all classes of special building contractors.

Leonard Berrien, who for a number of years has been in the building supply business in this city, has discontinued his business under the name of Leonard Berrien & Co., and will give his entire attention to the interests of the Arden Plaster Company, of Los Angeles.

## RATES ON CEMENT.

The following order of interest to the cement trade was issued at a recent session of the Interstate Commerce Commission:

In the matter of application No. 6213, of the Western Maryland Railway Company and other carriers, concerning the rates on cement. The application asks for authority to establish rates on cement, in carloads, from Union Bridge, Md., to points in Virginia, North Carolina, and South Carolina, shown in Philadelphia & Reading Railway Tariff Order I. C. C.-G. No. 69. The application is based on the desire of the petitioners to establish the same rates from Union Bridge, Md., to said points of destination as are concurrently in effect from Security, Md., a point in close proximity. The petition was granted.

A hearing was held in New York on May 9, before Special Examiner Henderson, of the Interstate Commerce Commission, in case No. 4732, that of the Barber Asphalt Paving Company vs. the Lehigh Valley Railroad Company et al.

The Youle gravel plant near Saybrook, Ill., has installed an electrically driven pump.

The Ballou Sand Works at Millington, Ill., has added a steam scraper to its equipment.

W. H. Welty of Rockford, Ill., secured the recent sand and gravel contract from the city.

Otis Hoffman of Jacksonville, Ill., is paying particular attention to the manufacture of cement vases for flowers and plants.

Charles Presley of Peoria has bought the Keifer cement block manufacturing business at Henry, Ill., and moved to that city.

The Peoria Washed Sand and Gravel Company of Peoria had a dredge cut a channel from the Illinois river to its bank at Chillicothe, Ill.

Contract for 1,200 barrels of Atlas Portland Cement was let by the Rockford, Ill., city council to the Rockford Lumber & Fuel Company.

W. H. Shons of Freeport, Ill., was awarded the contract for the new concrete bridge across the Pecatonica river at Pecatonica for \$13,281.

Milton M. Balbridge, Jr., of St. Charles, Ill., has been promoting a gravel corporation recently incorporated with \$50,000 capital stock to develop gravel deposits near Emporia, Kan.

Scott & Webster of Bondville, Ill., have completed a new building 88x20 in which cement blocks, brick and posts will be manufactured. They will also do all kinds of cement contracting.

The Peoria Trusswall Manufacturing Company of Peoria, Ill., is now specializing in lathe-turned concrete products such as porch and pergola columns, railings, balusters, lamp posts, urns and garden furniture.

A company to be known as the Mt. Carroll Cement Products and Construction Company is being formed at Mt. Carroll, Ill. It will be incorporated under the laws of Illinois and will go after bridge contracts. Meanwhile it is turning out cement brick and tile.

The Mt. Carmel Grain & Elevator Company of Mt. Carmel, Ill., has built two large barges for use in towing sand and grain on the Wabash river and has launched the hull for a 100-foot steamer which will be used a great deal in the sand business. A barge derrick for hoisting grain and sand has been equipped, the machinery alone costing \$3,000.

F. G. Cooper & Sons, who for years have been in the sand business at Saybrook, Ill., have opened a gravel pit at Gibson City, Ill. A switch has been built from the Lake Erie & Western line to the plant. Electrically driven pumps will be used later. There is said to be a twenty-five foot bed of sand and gravel thirty acres in area in the new holdings.

The American Concrete Construction Company, of Louisville, has been unusually successful during the past month in booking municipal pavement work.

Sam L. Robertson, of Louisville, concrete worker who gained fame as a legislator during the recent 1912 session of the Kentucky General Assembly at Frankfort, has all the work he can handle.

J. W. Yenawine, formerly secretary-treasurer of the Cannon-Byers Millinery Company of Louisville and later secretary-treasurer of the Tycerte Concrete Products Company, has severed his connection with the concrete concern, having disposed of his holdings to President G. E. Moody and other stockholders.

Charles J. Mazzoni, of the Central Concrete Construction Company, Louisville, has resigned his position as manager of that company long enough to afford time to build a concrete residence of his own. After Mr. Mazzoni has completed his home, it is probable that he will resume his connection with the Central concern.

In a companion contract with the Louisville & Nashville, the Foster-Creighton-Gould Company has secured the job of erecting fifty-two railroad bridges of less imposing size along the L. & N. division from Nashville to Birmingham. This work of improvement is to be completed, if possible, some time before the opening of the Panama Canal, as Southern railroads are already preparing for this important change in national transportation facilities. The Foster-Creighton-Gould Company has completed the erection of a \$700,000 bridge across the Arkansas river at Fort Smith, Ark., and is assuming a position as one of the leading concrete engineering firms of the country.

#### ORNAMENTAL CONCRETE FENCE.

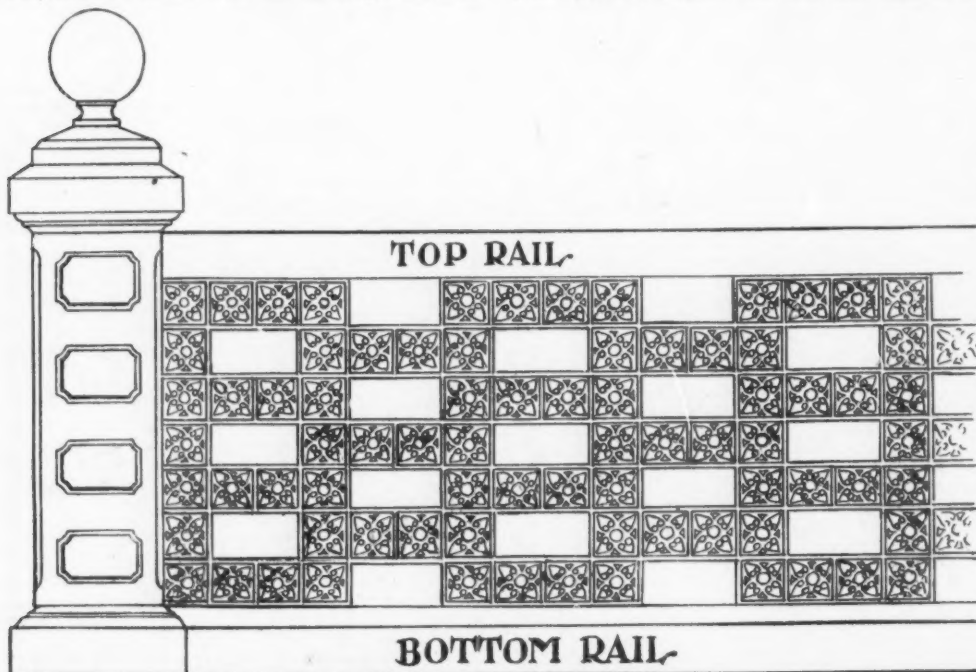
This cut illustrates one of the many designs which may be used to beautify the approach to farm houses, country estates, etc. Such a fence possesses many advantages over one constructed of wood; it improves the appearance of the home, requires no painting to make it presentable, does not deteriorate, but on the contrary improves with age.

With a set of molds any one can make the concrete products for the fence at a small cost.

The post is 12 inches square, the cap and base is 16 inches square, the sphere is 9 inches in diameter, and the lattice blocks are 4 inches high, 16 inches long and can be made either 4 inches, 6 inches or eight inches wide as desired.

Iron molds can be purchased for this work from one of the leading ornamental mold companies, located at Detroit, Mich., but the molds for the top and bottom rails can be readily made of wood.

A set of cast iron molds to make the post with ball, and the lattice work can be bought for \$45.



ORNAMENTAL CONCRETE FENCE.

#### CEMENT DRAIN TILE.

Paper Presented by Charles E. Simms at the Meeting of the Cement Users of Nebraska.

At the meeting of the Nebraska Cement Users' Association Charles E. Simms, Secretary of the Inter State Tile Association, presented a very interesting paper on drain tile, which we take pleasure in publishing herewith:

##### TILE!

I am only a hole in a humble vocation,  
Yet I greatly control your civilization;  
I am made of concrete, I am hard as a stone,  
And I am like old Horatius in holding my own.

Every farmer of pride dearly loves to provide  
For the future, the son and the daughter;  
So give me the chance and I'll greatly enhance  
Every acre I drain of its water.

And here's my great beauty—I'm always on duty,  
Out of reach of the Bulls and the Bears;  
And when you're in your grave I'll continue to slave  
For your children—their children—and theirs.

My habits are good—I require no food,  
I'm out of the way when down in the drain,  
And of this you may be sure I always abstain  
From anything stronger than water.

If your land is too wet and you're burdened with debt,  
And incumbrance begins to accrue,  
Obey Nature's laws—by removing the cause,  
Drain your farm or it will drain you.

'Tis so foolish to plant where the Goose and the Brandt  
Might paddle from March to September.  
You might as well sow on a November snow,  
And expect seed to grow—in December.

Most farmers lament the money they've spent  
For things only made to beguile;  
But never as yet did a farmer regret  
The money expended for cement tile.

Cement drain tile were first used commercially in 1905 when the first power driven machine to make tile out of concrete was invented. However, large quantities of hand made tile had been made for a number of years previous to this time and instances of their use long ago were known to those who were most interested in the history of this material. Hand made tile were found at Farmer City, Ill., which were put in the ground in 1872; at Ames, Iowa, in 1879; at Monterey, Minn., in 1883; at South Bend, Ind., in 1892; and other places. Cement sewer tile were known which had been in service for from ten to sixty years in many cities of Europe and America. (For more detailed information see Bulletins No. 17 and No. 24 of the Interstate Cement Tile Manufacturers' Association, to be had for the asking.)

With the certainty that good concrete would theoretically be an ideal material for tile and backed by the satisfactory service of many examples of practical use for many years cement machinery builders anticipated the demand for a machine which would make cement tile at a rapid enough rate and with a low enough labor cost to enable the manufacturer to compete with clay tile. Efforts to build a power driven machine were fruitless for many years for the reason that it was impossible to model after clay working machinery since concrete is not a plastic material. Concrete cannot be forced through dies so as to take the shape of a tile, hence the inventor of the new machine had to experiment at every step. When the first machine was sold and installed at

Graetlinger, Iowa, it was considered a wonder. It was a wonder, too, designed correctly in principle but woefully lacking in details necessary to make a smooth-running, profit-making machine. But it was a beginning and today the same make of machine and those of other makes are running in more than four hundred factories in the United States and Canada.

The following table gives the states in which drainage work is being carried on most actively, the number of feet of power made cement tile that have been laid, and the value of these tile at the factory, as near as can be estimated from the latest reports:

State.	No. at factories.	No. feet of tile.	Value at factory.
Iowa	108	42,900,000	3,750,000
Illinois	61	16,000,000	800,000
Indiana	60	15,000,000	500,000
Ohio	56	12,000,000	480,000
Minnesota	30	10,000,000	700,000
Michigan	16	3,900,000	175,000
Missouri	11	3,000,000	120,000
Nebraska	6	1,200,000	55,000
Arkansas	7		
Colorado	8		
South Dakota	4		
Mississippi	5	6,000,000	420,000
Canada	7		
Other States	30		
	418	110,000,000	7,000,000

These figures show a wonderful growth of a new industry. Most of these tile have been made while more or less experimental machines and methods were being tried out so that it is indeed remarkable that few instances of unsatisfactory products are recorded from these factories. In fact, some poor tile have been made,—a good many below the present standard of quality,—as would be expected in a business so new. While these may be held up as evidence against the standard still it may be truly said that no other material than concrete could have stood the abuse heaped upon it through ignorance of proper methods of handling it. And it may be said further that there is not on record a single instance where any cement tile made of standard materials under standard specifications have ever disintegrated from any natural conditions. They have gone into every kind of soil, millions of feet of them, and they are there doing their work satisfactorily and becoming harder and harder as we know good concrete does year by year.

Lest we go too far with our praises of this wonderful material, however, let me say that our praises are meant for concrete that is good in the beginning. We have right methods of making every article of manufacture, cement tile included. In the first place, we need clean, coarse, well graded sand and the sharper the grains the better; then Portland cement of standard quality; and lastly good water. These materials must be mixed in proper proportions and pressed into proper shape so as to make a dense walled tile. A porous wall is of no material benefit to drainage and any porous material is necessarily a weak material. The curing of the tile is the last step in the process of manufacture and is very important for freshly made concrete must be kept wet until the crystallization has gone far enough to permanently take up a sufficient quantity of water. The tile must be housed several days and must be kept wet during this period, after which they should be yarded and not sold sooner than thirty days. All these conditions are easily observed by the conscientious manufacturer but necessitate a permanent plant.

There are at least forty factories today with an investment in buildings, grounds and equipment in excess of \$15,000; one hundred plants with approximately \$10,000 invested; and the rest with from \$5,000 to \$8,000 invested. The largest factories are equipped with machines for making all sizes of tile from 4-inch diameter to as large as 44-inch internal diameter; the medium size factories do not make machined tile larger than 12-inch, possibly 16-inch diameter, but both classes of factories may be said to be fully equipped in all essentials for the proper manufacture of tile. The small factories oftentimes lack desirable economical facilities, such as elevators, car-system, and may even be without steam for curing—this not an essential but a very desirable feature. In these factories the amount of working capital used frequently exceeds the plant investment.

The type of factory to install depends entirely upon local conditions. Here in Nebraska you probably have little need for large tile, larger than 16-inch, hence we would not expect to find in this state the large factory, such as we find in Iowa, where as large as 44-inch have been used. Your drainage conditions call for smaller tile, hence the \$10,000 plant would be equal to your needs. A close study of the need for tile in a given territory, of the prices of sand and cement, of the cost and efficiency of labor, of shipping facilities and charges, and of probable competition, etc., should be given before a plant is established—certainly before the type of plant is decided on.

The time is here when extraordinary profits are not probable except possibly under unusual conditions, and those who contemplate entering the business should realize that competition was never keener than today. Farmers who are led by misleading advertisements into believing that a few hundred dollars spent in so-called machinery installed in a barn should bear in mind the fact that all they can hope to save is a few dollars on a thousand feet of tile, that theirs is all the risk if the expense runs higher than estimated as it usually does, and that theirs is the risk if the imperfections of the cheap machine, the inadequate housing, and the lack of sufficient knowledge causes dissatisfaction. The established factory with its reputation to maintain, with its prices held down by competition, can furnish the tile for the farmer of far better quality and at less cost than he can afford to make them himself.

William Wallace, of the Wallace Construction Company of Merrillan, Wis., has opened a new cement block factory in Merrillan.

C. C. Stowell of Rockford, Ill., used a night and day force in constructing a 100,000-gallon cement tank for the Burson hosiery factory at Rockford. The tank will be 56 feet high with conical bottom, 24 feet in diameter and walls 18 inches thick, reinforced.

## "ALCA" Lime

Saves time, worry and expense. It is highly plastic, hardens rapidly and does not stain. Suitable for all-around use in Mortars, Plasters and Stuccos.



## Berkeley Hydrated Lime



Pure High-Calcium Lime, mechanically slacked at the kiln. Will not air slack. Has absolutely no impurities. Renders mortars and concretes waterproof, lightens and warms the color tone.

## Security Portland Cement

Of absolute uniformity and guaranteed to pass Standard Specifications. Moderately slow setting. Shipping facilities on four railroads enable quick service.

*Our Information Bureau is at your service to answer questions and study out your problems. Write for instructive booklets.*

## Security Cement & Lime Co.

Head Offices: 813 Equitable Building  
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*"The Best That Can Be Made"*



THERE is no better way to encourage and promote the use of cement in your territory than by handling the "Chicago Double A" Brand. Our campaigns of education, conducted on behalf of the dealer, are a feature of our service and the use of our product insures satisfactory work.

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Open  
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An Extra Heavy, Extra Strong  
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For Cement, Plaster, Lime, Etc.

## West Jersey Bag Co.

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SALES OFFICE:  
Liggett Bldg., St. Louis



SALES OFFICE:  
Long Bldg., Kansas City

## THE Standard Brands

OF  
PORTLAND CEMENT  
Lightest in Color  
Highest Tensile Strength

ALWAYS, UNIFORM  
Always the same high quality. Prompt shipment guaranteed and made possible, as each mill is located within switching limits of the two greatest railroad centers of the West. You are assured of your orders being promptly filled.

MANUFACTURED BY

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KANSAS CITY  
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SAMSON PLASTER  
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WATERPROOFING MATERIALS  
BUILDERS' SPECIALTIES**

**SEWER-PIPE**  
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BLACK BANGOR AND  
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ALL SLATERS' SUPPLIES**

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Makes the most beautiful, distinctive and original surface for concrete work. It is unlike any other material and must be seen to be appreciated. If you want to do concrete work which will show a marked individuality, try this material. Sample sent on application.

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Plaster of Paris**



is made from the best selected Nova Scotia Gypsum, and is the recognized standard in quality. It sets slowly, works cool, has great tensile strength.

It is the lightest, the finest, a pure white in color, and absolutely uniform.

It has the greatest covering capacity and makes the hardest wall.

If you are interested in Finishing, Casting or Dental Plasters write for our "Riverside" Booklet. It tells how all Plaster of Paris is manufactured and why "Riverside" is the highest grade of Plaster made.

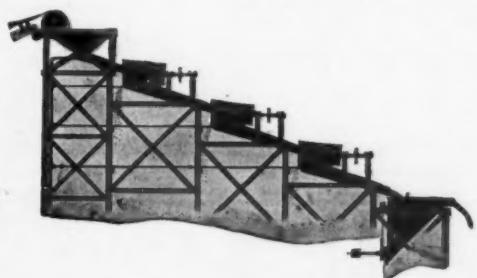
**Rock Plaster Manufacturing Co.**  
381 Fourth Ave. - - New York City.

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## Practically All the Washed Gravel Used Today Is Produced by the "S-A" Gravel Washing Plants

Our plants are located in all parts of the country and are operating successfully under all conditions.

We originated the general type of plant, used now exclusively, and we have adapted our system to the requirements of nearly two hundred practical producers.



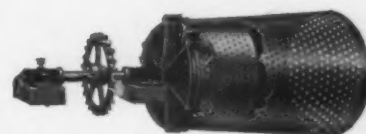
### Typical Arrangement

This arrangement of Gilbert Screens provides for any number of sizes to be produced at a cost about equal to dry screening. Very little power is required by these screens and their capacity is greatly increased by washing the stones through the perforations. The material passes by gravity thru the system of screens to the sand settling tank.

### The Improved Gilbert Screen

A small inner skirt in this screen takes the wear of the material as it falls from the chute. This plate is inexpensive and easily changed, and it triples the life of the outer plates.

**Our Engineering Department** We maintain a department thoroly experienced in the design of gravel washing systems. We will be glad to study your special conditions



## STEPHENS-ADAMSON MFG. CO.

AURORA, ILLINOIS

NEW YORK

CHICAGO

PITTSBURGH

ST. LOUIS

PORTLAND

BIRMINGHAM

LOS ANGELES

SAN FRANCISCO



## Promptness in shipments is of vital importance to the cement user whose storage capacity is

usually limited and whose work is so frequently dependent upon weather conditions. The big output of this Company, our enormous storage bins, the location of our mills near large centers of population where abundant labor may be had, where large car supplies are available, where connections with numerous railroads entering Chicago and Pittsburgh can be made readily—an efficient Traffic Department service—these form the basis of our reputation for quick shipments.

### UNIVERSAL PORTLAND CEMENT CO.

Offices:

Chicago - - - - 72 West Adams Street  
Pittsburgh - - - - - Frick Building  
Minneapolis - - - - - Security Bank Building

Plants at Chicago and Pittsburgh

**Annual Output 12,000,000 Barrels**

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## SOLID WOVEN WATER PROOF BELTING

BELTING ECONOMY  
is not secured alone by low first costs.

EFFICIENCY IN SERVICE  
together with reasonable first costs makes

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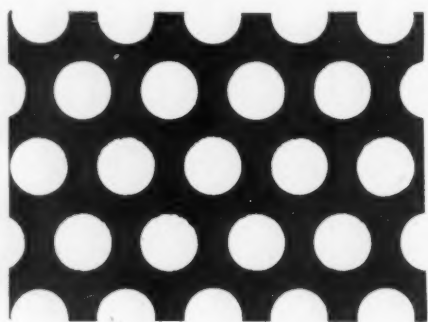
the most economical belt on the market for  
**DRIVES, CONVEYORS, AND ELEVATORS**

Let us figure on your requirements  
and show you convincing facts.

AGENTS IN ALL PRINCIPAL CITIES

KINDLY MENTION THIS PAPER

**THE AMERICAN FABRIC BELTING CO.**  
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Our perforated steel screens and elevator buckets have been going all over the United States for many years, and if you haven't tried them, a good time to start is right now.

Let us quote price on your next order.

**Hendrick Mfg. Co.**  
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NEW YORK OFFICE

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## 50c Hand-Book on Cement Sidewalk Building **FREE**

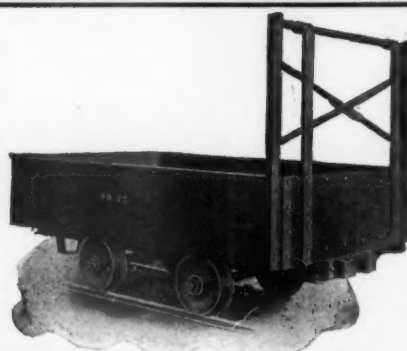
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Carefully designed and  
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under the severest  
exactions of quarry usage.  
There is an Industrial Car  
for every purpose and each  
is the best of its kind to  
be had.

Illustrated Catalogue  
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Successor to THE CLEVELAND CAR CO., West Park, Ohio

## "STAG" BRAND MANGANESE STEEL

WEARING PARTS FOR ROCK CRUSHERS AND CEMENT MILLS

RENEWABLE POINT DIPPER TEETH (Pat'd)

"MISSABE" STEAM SHOVEL DIPPERS

MADE ENTIRELY OF "STAG"  
BRAND MANGANESE STEEL

**EDGAR ALLEN AMERICAN MANGANESE STEEL CO.**

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NEW CASTLE, DELAWARE



TRADE MARK.

PERMANENT and THOROUGH

Water-proofing of Cement Work  
results from the use of

**Maumee  
Compound**

SPECIFICATIONS AND SAMPLES  
ON REQUEST

**The Maumee Chemical Co.**

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TOLEDO, O.

Tell 'em you saw it in ROCK PRODUCTS

# EVERLASTING WATERING TANKS

Many farmers and stockmen want to know how to build their own concrete watering tanks and troughs. The method is easy and a tank is not expensive. To explain the plan, a horse and cattle tank is described below which holds 30 barrels of  $3\frac{1}{2}$  gallons each. If desired, smaller or larger troughs, round or square, may be built in exactly the same manner. Such tanks, well made, never crack, wear out or cause mudholes.

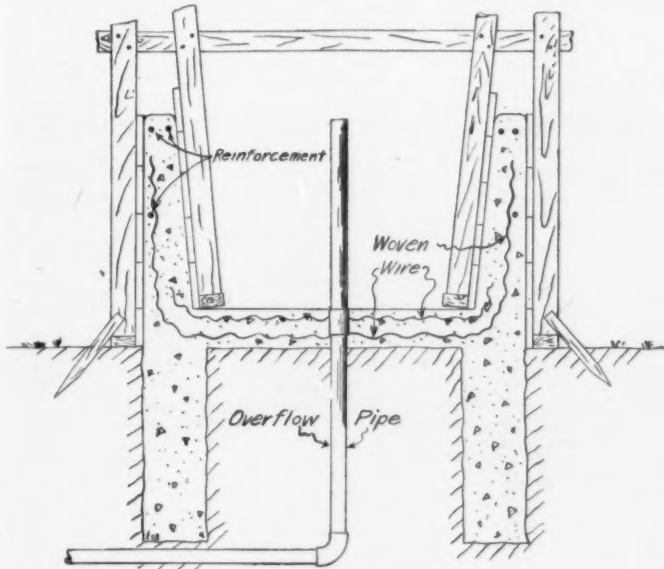
To build an oblong tank like the one shown in the picture, mark out the ground plan 5 by 14 feet. Within these lines scrape away all trash

or, if there is sufficient help, each form may be entirely completed and set up as one piece. The forms are held in position by 2-by-4-inch liners at top and bottom and, if necessary, by sloping braces nailed to stakes driven in the ground. Cut strips of heavy woven wire fencing long enough to cover the bottom of the tank crosswise and to project up into the walls to within 6 inches of the top, and likewise a strip 4 feet longer than the inside length of the tank.

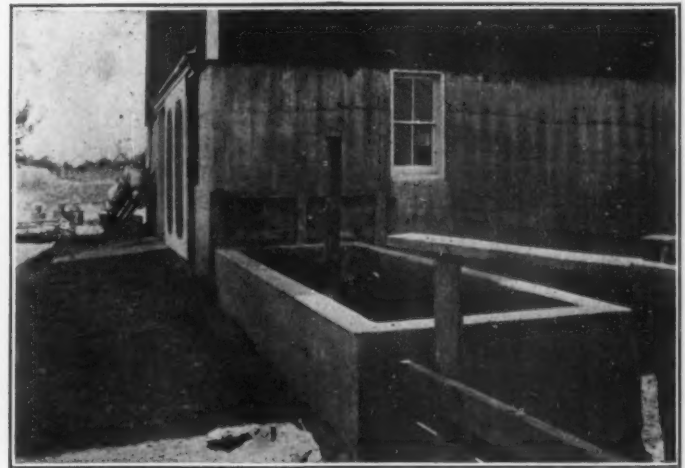
With the forms ready, mix the concrete 1 part Portland cement to 2 parts sand to 4 parts crushed

concrete mushy wet. Half-way up the side, and 1 inch from the outside, lay a  $\frac{3}{8}$ -inch rod (or several hooked together) entirely around the tank. Again 2 inches from the top and 1 inch from both inside and outside, imbed two more  $\frac{3}{8}$ -inch rods in the concrete. Round the top edges of the tank with a trowel or a sidewalk tool. If a tank cover is desired, insert  $\frac{1}{2}$ -inch bolts, heads down, in the soft concrete with sufficient length above the top of the wall to pass through the wooden cover and to receive a nut and washer.

When the tank is three days old, remove the



SECTION OF TANK.



CONCRETE TANK WITH REMOVABLE TANK HEATER.

and dig a foundation trench 10 inches wide and  $2\frac{1}{2}$  feet deep around the entire tank. Lay all in-flow and over-flow pipes (not less than  $1\frac{1}{2}$  inches in diameter) so that the ends, fitted for connections, will be even with the finished bottom of the tank.

Before digging the foundation trench, build the forms and have all materials on hand. For forms use 1-inch siding on 2-by-4-inch uprights spaced 2 feet apart. The outside form is a bottomless box 5 feet wide by 14 feet long, inside measurements. Make it 3 feet high to provide for a 6-inch floor and a clear depth of  $2\frac{1}{2}$  feet. The inside form must be narrower and shorter to make provision for walls 5 inches thick at the top and flaring to a thickness of 8 inches at the bottom of the tank. When ice forms, this slope allows it to slip up the tank walls instead of pushing directly against them. The sides and ends of the forms may be made separate and put together in place;

rock. In measuring the materials, count 1 bag of cement equal to 1 cubic foot. If bank-run gravel is used, mix the concrete 1 part cement to 4 parts gravel. Fill the foundation trench with concrete. Set the outside form in place. See that it is level, so that the tank will be level and can be entirely filled with water. Lay the 6-inch bottom reinforced  $1\frac{1}{2}$  inches from the under side with the short lengths of woven wire crosswise and  $1\frac{1}{2}$  inches from the upper side with the long strip of fencing. Bring up the extra length of wire so that the ends will project up into the future side-walls and can be fastened to the reinforcing rods. (This wire reinforcing in the bottom will prevent possible cracking due to heaving by frost.) Finish the surface of the bottom the same as for a sidewalk. Do not let concrete get into the in-flow and over-flow pipes.

With the bottom finished, immediately set the inside form in place and fill the wall space with

inner form and paint the inside of the tank with a mixture of cement and water as thick as cream. Screw into the over-flow connection the necessary length of over-flow pipe. The tank may be used in ten days provided the outside form is left in place. If the outer form is removed at the same time as the inner, do not use the tank for two weeks.

## BILL OF MATERIALS.

Crushed rock.....	$6\frac{1}{2}$ cu. yds. @	\$1.10....	\$7.15
Sand .....	$3\frac{1}{4}$ cu. yds. @	1.00....	3.25
Portland cement.....	$10\frac{1}{2}$ barrels @	2.50....	26.25
12 Rods.....	$\frac{3}{8}$ "x10', 45 lbs. @	0.02 $\frac{1}{4}$ ...	1.00
Total .....			\$37.65

By getting prices from local dealers, the cost may be found to be less. Such a tank is by far the cheapest to be had, since it never needs repairs and never wears out.

# HISTORY OF THE CONCRETE ROAD

The concrete roadway is a subject for profitable investigation and is now engaging the attention of the leading manufacturers of cement and concrete workers all over the country as it affords an outlet for cement which is not equalled by any other of its multitude of uses. Concrete foundations in street construction have been in use for quite a number of years. Street pavements in New York city used concrete as a base as early as 1888 and at the present time nearly all the cities require that concrete foundations shall be laid under all classes of pavements. It is clearly understood that the success of any pavement depends largely upon its foundation.

It is said that one of the reasons why the manufacturers of cement have not pushed the concrete roadway is that they were afraid that the men who are in the business of laying asphalt, brick, granite blocks and wood blocks would retaliate in some measure by refusing to use concrete as a foundation. There may be some truth in this but if there is it shows that the men who are in the business of laying these other kinds of pavement must be afraid of the ultimate success of concrete roadways or they would not take this stand.

There is no question of the absolute success of concrete when used as a foundation and it is doubtful whether the other characters of pavement would be as successful if they were laid on any other kind of a foundation. While all concrete roadways are of comparatively recent origin, the first of which we have any knowledge being that which was laid as early as 1894 where alleys were paved with concrete in Boston using methods similar to side walk construction, except slightly thicker layers of concrete and surface divisions in the small blocks instead of large ones so as to give better footing for the horses.

In 1903 there were laid several concrete streets in Richmond, Ind., and these are in fairly good condition today. They have required less repairing than ordinary streets and can be considered as satisfactory. These are the first places where concrete pavements were used in this country but since then quite a number have been laid with more or less success depending to a considerable extent upon the methods employed and the soil and other conditions.

Going back into the history of concrete roadways the oldest known is the Appian Way, portions of which are still standing. Logan Waller Page,

director of the office of Public Roads gave an interesting description of the Appian Way which was begun by Appius Claudius 312 B. C. in a paper read before the Association of American Portland Cement manufacturers recently. To quote from Mr. Page's paper he answers the following question: "Why have the Roman Roads stood traffic conditions for so many centuries? In the construction of the Roman roads of the best type, a trench about 3 ft. deep was excavated the entire width of the road, and wherever poor material was present it was removed and replaced by suitable material, and the whole subgrade was thoroughly compacted by ramming. Generally four distinct layers were placed in these roads. The bottom course, or statumen, was composed of two courses of stones placed in lime mortar. On top of this was placed the rudus or rubble, which consisted either of broken stone or, when available, broken bricks, potsherds, etc. When the latter composed the aggregate, more lime was used in the proportion of 2 to 5. This course was very thoroughly rammed and was usually about 9 inches thick. The third course, or nucleus, was composed of old building material, such as brick-bats, broken tiles, etc., mixed with lime in proportion

of 1 to 3. This course was not rammed and the lime was mixed hot. Above this course came the top or wearing surface called the *summa crusta*, which was made of blocks of flat stone set in mortar and fitted together with great refinement. It can be seen that the third layer, or nucleus, was much softer than any of the others, and was placed purposely below the top layer which was designed to take the wear of traffic.

"This type of road was undoubtedly the result of much experience. There are four distinct features which I consider worthy of the fullest consideration. First, an absolutely secure foundation was always obtained; second, a resilient or cushion layer was placed just beneath the wearing surface; third, the four layers composing the road had different co-efficients of expansion which would probably preclude the development of definite lines of stress brought about by contraction; fourth, the exposed or wearing surface was composed of a material which would not only withstand the wear of traffic, but atmospheric conditions as well.

"We frequently hear the statement that the Roman method of road building is a lost art, and that we cannot build roads today of a similar character. This is altogether a mistake. We could not only build similar roads, but roads which under the same conditions would be more durable. A road of the Roman type under modern city traffic conditions would last only a few years, and would probably cost \$250,000 a mile to build. The traffic they were subjected to consisted of light vehicles and unshod horses, and the fact that unshod horses were used leads one to believe that an earth cushion was probably maintained on the surface of these roads, as otherwise a horse would go lame after 50 or 60 miles of travel. The portions of Roman roads that we find intact today are those which have either been subjected to very light traffic or covered for long periods of time. In most cases we find only portions of the foundations."

Mr. Page is carrying on a series of experiments to ascertain the practicability of mixing semi-asphaltic base oils with Portland cement concrete with the object of retaining the desirable properties of both the cement and asphalt. It will be interesting to watch the result of these experiments, Mr. Page's idea being to secure if possible a concrete which will be resilient and tough and act as a cushion, since it is known that the apparent success of the old Roman roadways was the fact that underlying the first course was a soft course designed to act as a cushion layer. Another point which he brings out which it is well to observe is that the layers each had different co-efficients of expansion.

It is well not to be too hasty in claiming that the concrete street is capable of carrying the great traffic in the center of a large city but it is safe to assume that 75 per cent of the streets in any city could be built of concrete at a great saving in cost and if properly laid would prove to be the real solution of the paving problem which is occupying the minds of so many men all over the world today.

The ideal pavement is durable, noiseless, clean and sanitary, not too hard, capable of giving a foothold to a horse, low in first cost, and low in maintenance. That the concrete street meets these requirements more fully than any other street today is the opinion of many who have given the subject deep consideration and thought. For streets or roads of ordinary travel it will prove much more durable and satisfactory than macadam and will cost much less than the standard high cost pavements. It should fill a proper field in the wide gap which now exists between macadam and such costly pavements as granite blocks, brick, wood blocks and asphalt.

There are still a few problems to be worked out in order to make the concrete roadway an absolute and unqualified success, and these we feel will be worked out in time, as it must be remembered that all kinds of new pavements require time and patience and a fair trial to develop the proper composition and the best methods of construction. As we see the faults in these pavements which have been laid, we will undertake to remedy them and finally evolve a perfect pavement. The very fact that the great majority of concrete pavements thus far laid have proven entirely satisfactory warrants further experimentation along these lines and we confidently believe that all of the present faults can be corrected. The wearing surface is the one stumbling block which has so far baffled most of the layers of concrete pavements.

Concrete, as is well known, is brittle and is subject to contraction and expansion. If the wearing surface is too hard it will be hard on the horses' hoofs, but this same fault can be found with the granite block and with brick. The edges

of concrete pavements should be protected so as to prevent if possible the chipping off of the concrete. It is not necessary to have the expansion joints so wide that these will afford opportunities for this chipping. Some people object to concrete pavement on account of its smoothness, saying that it is slippery, but this same objection applies to other pavements as well, especially asphalt, which, for probably nine months in the year, is a very slippery pavement, especially in the north. It would seem that the best surface material for concrete roadways would be very hard trap rock or some equally hard material placed on the top of the concrete mortar mass before it sets and being only partly embedded in the mass; thus when the concrete finally sets the roadway would be rough, affording a foothold for the horses.

As the gap between macadam and high cost pavements is so great it would seem that the mistake that some of the advocates of concrete streets have made up to this time is that they are trying to put down a pavement at too low a cost. On roadways where travel is light a 6-inch concrete street would be sufficient depth providing that the foundation was not so soft as to wash out from underneath. Where the concrete street is to be used for any amount of traffic it would be well to make it of a depth of not less than 8 inches, and even a greater depth would be better as affording a firmer foundation, even though the cost was increased.

We do not believe that it is necessary here to go into the details as to proportions and the sizes of the stone, but all are agreed that the lower or foundation course should contain the large sized broken stone to a depth of from 4 to 5 inches, according to the depth the entire pavement is to be, and that the upper or wearing surface should not be less than 2 to 3 inches in depth. How to get the resiliency which Mr. Page says was the real reason the Roman roadway stood so long is a question yet to be solved. A model layer of some kind of material, say broken stone, with the voids filled with sand or gravel, this to be rolled before the upper surface is placed thereon. Of course, if it is found that after investigation and experimentation that semi-asphaltic base oils mixed with concrete would reduce the brittleness and increase the resiliency, this could be used for the second course. It is further believed that concrete mixed in this manner would also be impervious to water, especially if there should be a certain amount of hydrated lime used in the mix.

It would not be amiss to mention a few of the present methods now in vogue, among them the patented type of pavement such as that laid by the Blome and Hassam companies.

In a handsome booklet issued by the Atlas Portland Cement Company on the subject of concrete in highway construction they give the following essentials of a concrete pavement: First, thoroughly compacted sub-foundation; second, foundation (unless the soil is very porous) of porous materials rolled or otherwise compacted; third, a base of first-class Portland cement concrete; fourth, a wearing surface composed of a standard Portland cement and a carefully selected aggregate; fifth, expert and very careful workmanship. Continuing, this book says that the fine aggregate for the surface layer is of the utmost importance. Perhaps the best material is crushed granite or crushed trap whose particles pass a quarter-inch sieve and which contains scarcely any dust. Sand may be used provided it is of exceptionally good quality, coarse, clean and free from clay or other fine matter and absolutely free from vegetable loam.

The natural sand the percentage of dust passing a sieve having 100 meshes to the linear inch might well be limited to 3 per cent.

The Blome pavements consist of 5¼-inch thickness of concrete with a 1¼-inch surface of richer concrete, the two layers being laid so as to give it thorough union. The foundation is of sand, gravel, broken stone, or cinders where the soil is clay or hard pan, or in fact in any soil except a porous sand or gravel. Expansion joints, ½-inch wide, are left along the gutters or curbs. After the subgrade and foundation have been prepared, there is deposited concrete composed of 1 part of Portland cement, 3 parts of sand and 4 parts of crushed limestone, trap rock or clean gravel.

The cost of this pavement varies greatly, depending upon the location, quantity of work, cost of various materials and labor. Prices range from \$1.50 to \$3 per square yard, not including excavation or grading. Its use compares favorably in cost with brick, asphalt or creosote or wooden blocks on concrete foundations.

The Hassam pavement is laid in the form of grouted macadam street or as a granite block pavement on a grouted macadam foundation. As usually laid it consists of a properly compacted subgrade upon which is placed a layer of broken stone thoroughly rolled to a thickness of 6 inches and made to

conform to the grades and contour of the street. After this stone has been firmly compacted by rolling and the voids reduced to a minimum, it is grouted with a Portland cement grout made of 1 part of cement and 2 parts sand. This grout is poured upon the stone until all the voids are filled and the grout flushes to the surface. The rolling is continuous during the process of grouting. Upon this surface is placed a very thin layer of pea stone, which is spread over the entire area of the roadway, grouted and rolled, the rolling to continue until the grout flushes to the surface. Expansion joints are left along the curbs. A sample of the Hassam type of pavement is the Long Island Motor Parkway.

The subgrade was shaped and rolled with a 10-ton roller. A 2½-inch layer of broken stone, 1½ to 2½ inches in size, was then spread upon the subgrade and upon this broken stone a wire fabric reinforcement, such as the triangle mesh manufactured by the American Steel & Wire Company, was laid over the entire width of the roadway and the separate sheets overlapped. A layer of broken stone was then spread upon the fabric so as to conform to the cross section of the roadway and to give a pavement 5 inches in thickness after rolling. After the ballast was placed on the reinforcement it was thoroughly rolled, compacted with a 10-ton roller. Portland cement grout made with 1 part Portland cement and 2 parts sand was mixed in a mechanical mixer and poured upon the surface of the rolled ballast until all the voids were filled and until the grout flushed to the surface after rolling. The grout was colored with lamp black to slightly color the finished pavement.

After the grout had been poured and rolled a thin layer of pea stone was spread and grouted and the surface again rolled as before. The finished pavement was given a rough surface by brooming, so as to form very small ridges at right angles to the length of the roadway. Care was taken to complete all rolling after grouting each section before a sufficient period of time had elapsed to allow the cement to take its initial set. Automobiles were allowed on the finished pavement ten days after completion.

A Hassam pavement completed in Watertown, Mass., during October, 1908, at a cost of \$1.85 per square yard, was made in a similar manner without the reinforcement.

Reverting back to streets and alleys which were paved with concrete in Richmond, Ind., in 1896, these cost \$1.62 per square yard. The usual pavement for streets of ordinary traffic in Richmond have a concrete base 5 feet 6 inches thick with a top wearing surface 1 inch or 1½ inches thick. For such pavements, that is, those requiring thickness of 6 inches or 7 inches, the foundation consists of 8 inches rubble, field cobble stone, the refuse from quarries or coarse gravel. On this layer is spread sufficient gravel to fill the voids and after flooding and ramming it makes a total thickness of the foundation of 10 inches. On this foundation 5 inches thoroughly rammed 1:2:5 concrete is laid in blocks 10 feet by 15 feet. The wearing surface 1½ inches in thickness and composed of 1 part cement to 2 parts clean coarse sand or else of 1 part cement, 1 part sand and 1 part clean crushed stone screenings, placed on the 5-inch base before the layer has set. The wearing surface was troweled down to insure contact, and leveled off with a straight edge. When hard enough it was floated or troweled to a smooth continuous surface. This was finally pitted with a brass roller except for marginal strips two inches wide around the edges of the blocks. The wearing surface was made into blocks the same size as the base.

For streets having heavy traffic a concrete base is laid in addition to the regular pavement so that the total thickness is the same as a brick pavement on a concrete foundation or about 11 inches in all.

From the information given above we leave it to the concrete worker to use the method best suited to the conditions surrounding him. No hard and fast rule can be laid down which can be followed out in any section of the country. A pavement suitable for a southern city like New Orleans would in all likelihood not be acceptable in a northern city with a more rigorous climate. Subsoils have a great deal to do with the depth of the concrete and the amount of traffic to which the roadway will be subjected is to be taken into consideration.

It would make a pavement extremely costly to prescribe granite where granite was not available or to say that trap rock should be used where this was not found at hand, so conditions must be met in each and every locality. Our advice to the concrete operator who wishes to engage in a very profitable business is to experiment in his own home by laying a section of street using different methods and testing them out.

The cost of repairing concrete roadways is considerably less than any other street pavement, for the reason that where holes are worn the same can be taken out, recrushed and used in the foundation again, thus reducing the cost of the repairing considerably. Concrete streets can be kept clean as easily as an asphalt street.

# ROAD BUILDERS WILL NOT AFFILIATE

At a special meeting of the board of directors of the American Road Builders' Association, held at Hotel Astor, New York City, May 10, it was voted to withdraw from further participation in the joint road congress which the association had considered holding in cooperation with the American Association for Highway Improvement, the American Automobile Association and the National Association of Road Material and Machinery Manufacturers. This action was taken after several weeks of deliberation and conferences among committees of the several associations, and is the final action of the American Road Builders' Association.

As is generally known, the first tentative plans for a joint congress of these four associations were made at Richmond, Va., during the first annual convention of the American Association for Highway Improvement. It was thought at that time by some that much good could be gained by such action, inasmuch as, instead of, to a certain extent duplicating the conventions of other associations, each of the four associations could bring to one general meeting those who would naturally attend its convention, thus making possible a convention with a much larger attendance than could be hoped for at the meeting of any single organization. A committee of eight was, therefore, appointed, consisting of two members from each of the organizations above named. Subsequently each association appointed three members to serve on a joint committee known as the Committee of Twelve, which committee, in turn, created an executive committee to which was given full authority to make and carry out all plans for the joint congress. Friction soon developed in the executive committee to such an extent that the success of the entire plan appeared doubtful, if not impossible.

The situation was brought to the attention of the directors of the American Road Builders' Association at a meeting held on April 25, 1912, at the Hotel Astor, New York City, and after a thorough discussion of the question the following resolution was adopted:

**Resolved,** That the question of further participation by the American Road Builders' Association in the proposed Joint Road Congress be referred to the three representatives of this Association in the Committee of Twelve; that if these representatives are convinced that the interests of this Association will be properly safeguarded, the officers of the Association shall continue their cooperation with the other affiliated bodies in completing and carrying out plans for the Congress; but that if the said representatives of this Association are not satisfied that the interests of this organization are to be properly regarded, they shall report back to the Board of Directors, in order that it may take such action as the circumstances demand.

In accordance with this resolution, Nelson P. Lewis and Harold Parker, two of the three representatives of the American Road Builders' Association on the Committee of Twelve, sent to the other members of that committee the following communication:

AMERICAN ROAD BUILDERS' ASSOCIATION,  
OFFICE OF THE PRESIDENT,  
NO. 277 BROADWAY,  
New York, May 3, 1912.  
TO THE COMMITTEE OF TWELVE:

Gentlemen:

At a special meeting of the Board of Directors of the American Road Builders' Association, held on April 25, 1912, the following resolution was adopted: "Resolved, That the question of further participation by the American Road Builders' Association in the proposed Joint Road Congress be referred to the three representatives of this Association in the Committee of Twelve; that if these representatives are convinced that the interests of this Association will be properly safeguarded, the officers of the Association shall continue their cooperation with the other affiliated bodies in completing and carrying out plans for the Congress; but that if the said representatives of this Association are not satisfied that the interests of this organization are to be properly regarded, they shall report back to the Board of Directors in order that it may take such action as the circumstances demand."

The circumstances which led to the adoption of this resolution may be briefly stated as follows:

The Committee of Twelve, which consists of three

representatives of each of the following associations, namely:

- 1—The American Association for Highway Improvement,
- 2—The American Automobile Association,
- 3—The National Association of Road Material and Machinery Manufacturers, and
- 4—The American Road Builders' Association

at a meeting held on February 17, 1912, appointed an Executive Committee consisting of one representative of each of the above named organizations, which was given full power to make and execute all plans for the proposed road congress. This committee organized, elected a chairman, to whom it delegated certain specific duties and authority, and made other appointments of officials. On April 16, a majority of this committee met, and, although the chairman was absent, reorganized the committee, rescinded all previous action, and elected permanent officers of the congress. The president, secretary and treasurer of the congress so elected each occupy corresponding offices in the American Association for Highway Improvement.

The Board of Directors of the American Road Builders' Association at its meeting above referred to adopted a resolution strongly condemning the action of a majority of the Executive Committee in thus arbitrarily deposing its chairman, in repudiating all of his acts, in dismissing all employees who had been appointed by him under authority given by the committee at a meeting at which all the members were present, and in electing at the same meeting new officers, including the permanent officials of the congress, all of such officers holding identical positions in a single one of the affiliated organizations. This action was taken at a meeting held six days before the date upon which the chairman of the committee stated that he would call a meeting, and he had assured each of the other members of the committee that pressing business engagements prevented his presence at the meeting on April 16.

Our criticism of this course is not due to the fact that the chairman, who was treated with this scant courtesy, was our representative in the Executive Committee, but to our conviction that the success of the proposed joint road congress will be impossible under such methods. We are likewise convinced that the three organizations which had declared their willingness to cooperate with the American Association for Highway Improvement in a Joint Road Congress would inevitably become nothing more than affiliated bodies under the leadership of the last-named organization, whose general officers have now become the officers of the congress.

We, as representatives of the American Road Builders' Association, feel that the situation has passed beyond our control, and that we must, therefore, report back to our board that we are convinced that the interests of our association cannot be properly protected under existing conditions. We wish to punctiliously observe any obligation which we may have assumed. Our financial obligation is limited to \$250 provided that expenses of not less than \$1,000 have been properly incurred.

We believe that we should place the interests of our association above those of the proposed joint congress. Should the Board of Directors of the American Road Builders' Association decide to withdraw from the congress, we beg to express the hope that the representatives of the other three organizations will release us from any further obligations except the financial one above referred to.

Respectfully,  
(Signed) NELSON P. LEWIS.  
(Signed) HAROLD PARKER.

Representatives of the American Road Builders' Association in the Committee of Twelve.

Final action in the matter was taken, as previously stated, at a special meeting of the Board of Directors of the American Road Builders' Association on May 10. At this meeting, Messrs. Lewis and Parker submitted their report, which was as follows:

To the Board of Directors of the American Road Builders' Association,  
Gentlemen:

At a meeting of the Board of Directors held on April 25, 1912, the question of further participation by this Association in the proposed joint road congress was referred to the representatives of this association in the Committee of Twelve, with instructions to consider whether the best interests of this association would be furthered by such participation, and if the said representatives were not

convinced that its interests would be advanced to report back to the board.

In accordance with their instructions, your representatives have given the matter very careful consideration and have become convinced that under the conditions now existing this association would have nothing to gain, but that its importance, its dignity and its usefulness would be jeopardized by its adherence to the congress. The considerations which have led us to this conclusion are set forth in a communication which we have addressed to each member of the Committee of Twelve, copy of which is herewith submitted and made a part of this report. [This letter is printed earlier in the article.—Ed.]

Pursuant to the further instructions embodied in the resolution of April 25, we report this conclusion to the Board of Directors in order that it may take such action as it deems best. Whatever this action may be we will promptly communicate it to the Committee of Twelve.

Respectfully submitted,  
(Signed) NELSON P. LEWIS.  
(Signed) HAROLD PARKER.

After hearing this report, the board unanimously adopted the following resolution:

**WHEREAS:** The American Road Builders' Association acting through its Board of Directors, did at a meeting of the said board, held on January 18, 1912, decide to cooperate with the American Association for Highway Improvement, the American Automobile Association and the National Association of Road Material and Machinery Manufacturers, in a joint road congress to be held during the present year, and appointed three representatives to act with a similar number of representatives from each of the other associations, and,

Whereas, The Committee of Twelve thus constituted, did appoint an Executive Committee to carry out this purpose, and,

Whereas, The said Executive Committee has pursued a policy which we believe will make the success of the proposed congress improbable if not impossible, and,

Whereas, We believe that the avowed objects of this organization will not be promoted by the proposed joint congress, while the importance and dignity of the Association will be impaired; therefore, be it

**Resolved,** That this Association withdraw from further participation in the proposed joint road congress and the secretary is directed to communicate this decision to the said Committee of Twelve.

The secretary has carried out the instructions embodied in the resolution, and by that action the American Road Builders' Association has definitely and finally withdrawn from all participation in the proposed joint congress, although forced to the action by circumstances outside of its control, and a committee has been appointed to arrange for the usual convention and congress of the association. It will be felt by many members of the association and by its friends that the step is a wise one, since there is little doubt but that the serious work undertaken and hitherto successfully carried out by the American Road Builders' Association can be better done by its adherence to the policy adopted than by affiliation with organizations having different aims and objects.

## REDUCTION WORK.

The Secretary of the Interior has authorized the Reclamation Service to advertise for bids for the construction of the Dodson North Canal and the extension of the Dodson South Canal, in connection with the Milk River irrigation project, Montana, the estimated cost of which is \$811,000. Bids will be opened May 21 and specifications may be obtained by addressing the U. S. Reclamation Service, Helena, Mont.

No new quarry development has been started of late around San Francisco, but the demand for crushed rock is fully up to normal, and most of the quarry operators look for a busy summer.

The Fox & Holloway Sand Company, of Buffalo, is making preparations to occupy its new yards at the foot of Hamilton street, new dockage facilities, equipment, etc., being now in the last stages of completion.

# NICARAGUAN MINISTER AND THE PANAMA CANAL

Washington, D. C., May 15.—Although representing a country which offered an attractive route for the canal connecting the Atlantic and Pacific Oceans, which route was vigorously pressed in Congress but which was not selected, Senor Salvador Castrillo, the Nicaraguan Minister to the United States, is enthusiastic over the possibilities of the Panama Canal for Central and South America. Senor Castrillo granted an hour's interview to a representative of Rock Products at his apartment in Stoneleigh Court and talked interestingly of his country and the great benefits which would accrue to the countries to the south of us as the result of the opening of the great waterway between the two oceans. Senor Castrillo sees in it a great immigration to the Central American Republics, and looks for the day to soon come when these South and Central American countries will be banded together into a grand federation, each of the countries being a separate State, like the United States system.

"Nicaraguans are proud of the fact that their country was the first of the South American Republics to be colonized," said Dr. Castrillo, in opening the interview. "Columbus first touched at Nicaragua on his voyage to America. The first colonies were on the Atlantic side and the population began to move over to the Pacific, where are now the principal towns. The first advantage which the opening of the Panama Canal will give to our countries will be the opening up of direct routes to the United States and Europe. Under existing conditions the route is particularly difficult. We have no direct way to the United States or Europe. Therefore commerce is difficult to undertake and the lack of this exchange of commerce retards the development and growth of these countries in everything that goes to make up a nation. We have no direct route to New Orleans, which is not so far from Nicaragua. We must either cross the Isthmus or go around Cape Horn. These conditions have resulted in no direct commerce being had with the United States. When the canal is opened all the Atlantic ships will go to the Pacific. It will only be two days from the canal. There will be a great revival of shipping between New York and other Atlantic ports to the Pacific, which will develop a great commerce in the abundant industries of the Central and South American Republics. The Atlantic ports will be greatly benefited by the opening of the canal because the great steamers which now have to make the long and tedious journey around the world will go direct from New York through the canal to the Pacific.

"The opening of the canal will also result in the attraction of a great tide of immigration to the South and Central American Republics. I cannot foresee all the incalculable benefits to come from the canal. All the countries around about the canal will be helped. The countries near Panama will be more benefited than even Panama itself. Nicaragua is larger than New York State in territory. It is abundant in productivity of a varied line of fruits, vegetables and live stock. It is a country of great altitudes and has delightful climatic conditions. The general average of temperature is about like that of the spring weather here in Washington, although it may be a trifle cooler. My country is one of the greatest cattle raisers of the world. We can supply cattle to all of Central and South America, and can also export great quantities. We have also extensive cocoa plantations. Nicaragua has also enormous forests and a part of the mountains have not yet been explored. These vast resources, yet untouched, and also the abundant production of fruits and other crops, will be open to the world's markets by the opening of the canal. To my mind the opening of the Panama Canal will also develop a tourist travel to the countries to the south of the United States and open up to the traveler many beautiful scenes well worth the visit. There is as beautiful scenery in the South American countries as can be seen anywhere. The opening of the canal will make direct routes to these countries, reduce the expense of the trip, and afford opportunities for travel in this part of the world. The opening of the canal will also permit the exploration and exploitation of these countries and their productivities. The completion of the canal will also give these countries a better market for their coffee.

"When the canal is opened there will be so many ships on the waters in the carrying trade that it will result in a reduction of the freight rates," continued Senor Castrillo. "The exchange of products will be at very little expense of exportation, and I look for a tremendous leap in the

exports of products from the South and Central American countries to follow. The United States will also greatly benefit from the opening of the canal. It should be the means of establishing a merchant marine to take care of the trade which will flow from the South American countries to the United States.

"Have you any comments to make on the question of tolls for the ships passing through the canal?" Dr. Castrillo was asked by the correspondent.

"That is entirely a question for the United States to decide," he responded. "The canal is the result of the enterprise and labor of your great country. No other nation would take up the stupendous project, but the United States, with its energetic spirit, went to work and dug the great ditch which will soon open up a direct passage way from the Atlantic to the Pacific. It was such a magnificent undertaking as to arouse the admiration of the world. The canal properly belongs to the United States and to my mind it should do with it as it seems best. The United States had an expensive proposition in constructing the canal. It seems to me that as the United States had the risk of the undertaking and did the work it ought to have the profit of the project. That is but natural. I have no opinion on the matter of tolls, but if tolls are levied on ships passing through the canal, it may increase the cost of the merchandise and the United States would be benefited. The increase, however, would not be very large.

"The production of articles of commerce by the United States ought naturally to increase by the opening of the canal," continued Minister Castrillo. "It should more than ever become a heavy producer and compete with the foreign countries in trade. I look for an increase in the export trade of the United States and competition with other countries when the canal is finished.

"The canal will also be a great advertisement for the Central and South American countries. People will want to see what kind of country and people live in that territory and will naturally go there, if only for curiosity. When there they will be attracted by the beauty of the country and the possibilities for trade and business and the result will be beneficial to both the countries and the visitors.

"A fact not to be overlooked," continued the Minister, "is that the opening of the canal will promote peace in these South and Central American countries. Being brought into closer touch with the other parts of the world by commerce, shipping, and travel, these countries will want to preserve a peaceful attitude to show off their best side. It will incite the people to greater work and activity. The life of the South and Central American Republics is now essentially political. All the struggles are for political supremacy. The canal will be the beginning of the opening up of a business life for these countrymen and one of progress in industries.

"Will the canal be as beneficial as the Nicaraguan route would have been?" asked the correspondent.

"While the canal by the Nicaraguan route would have been easier of accomplishment, at the same time Nicaragua and the other countries will have all the benefits of the canal and the same as if it had been over the Nicaraguan route. If the Nicaraguan route had been selected," said the Minister, "the canal would have been finished by now. There would have been no mountain to cross. It is a low country in Nicaragua where the canal would have passed over. But there will be the same benefits from the Panama route as if the canal was over the Nicaraguan route.

"I also believe the opening of the canal will bind the South and Central American Republics closer together. The recent trip of Secretary of State Knox to those countries showed the friendly attitude of the United States toward Central America and dispelled all the erroneous stories going the rounds that the United States will seek to take possession of these countries. The United States does not want these countries added to its territory. The United States is trying to help these countries. Our countries favor the United States influence rather than European influence. With the United States there is no danger of our territory being taken from us. With Europe there is the danger. The United States wants no more territory. It wants commerce. Europe wants other territory. The United States seeks to protect the South American countries for the benefit of the individual countries and not from the viewpoint of the colonizer. But with the European countries the case is different. When they want more coun-

try they look to South America, which has been looked on as a 'spoil ground.' That is their life; one country is envious of another in getting control of territory. But the United States' policy is the opposite. It does not contemplate the taking over of other territory and keeping colonies. It is strong by position and not by colonies. It set Cuba free and will also release the Philippines to their self-government when the time comes. The South and Central American countries are not afraid of the United States, but like its influences because it is for our good.

"The ambition of the South American countries is to be one grand big country or federation with each of the now separate countries as States, on the order of the United States. The Panama Canal will bring that about."

## NATIONAL COMMERCIAL CONGRESS.

The commercial congress meeting in Washington the last week in April was the most important conference looking to non-partisan organization and co-operation with the Government ever convened in Washington. To the fullest extent possible the Trade and Transportation Bureau has advocated and urged such a plan as has now been adopted by the delegates. The name chosen—"The Chamber of Commerce of the United States of America"—offers a platform whereon all business can unite as to deliberation on questions of national scope and policy. President Taft's opening address was appropriate and comprehensive and was a proof of the Chief Executive's desire to assist the business world in a broad way. The election to the presidency of H. A. Wheeler, president of the Chicago Association of Commerce, was the selection of one of the foremost business men of the country in energy and sane progress. With John H. Fahey, of Boston, he was a most influential factor in initiating some concrete plans for the early operation of the new commercial body. Secretary Nagel of the Department of Commerce and Labor, ably assisted by A. H. Baldwin and David Skinner, of the Bureau of Manufactures, were the important factors in government co-operation for the inauguration of a new Chamber of Commerce. It is of course understood that the new organization can not officially take cognizance of those things that are specific only in effect and more or less personal and individual in character, but must devote itself to principles and policies of general and national interest. In legislation and commercial matters its program must be comprehensive and free from such partisan lines as will interrupt the great influence now ahead of it. This was, we believe, clearly set forth by Mr. Wheeler. Permanent headquarters are to be opened in Washington. We are gratified to note the number of individuals and trade organizations, subscribers to our bureau, represented at the meeting.

## THE TITANIC.

The whole community has been depressed by the disaster to the Titanic, involving the loss of 1,635 human lives. The harrowing details of this great calamity, together with the fact that the loss of life might apparently have been greatly reduced had proper life-saving apparatus been provided, naturally engaged the attention of the public to the exclusion of everything else for a considerable period following the loss of the ship on April 15 last. Allowing for all forms of insurance—marine, life and accident—included in the wreck, it is probable that fully \$20,000,000 will ultimately be paid out in connection with the affair. Most of these payments will be made by the great underwriting corporations of Europe, so that a conservative estimate would seem to be that between \$5,000,000 and \$10,000,000 in foreign credits will be created in favor of American policy holders when the loss claims are finally adjusted. Although the disaster represents a great waste of property, the fact that the losses will be distributed among a large number of underwriters means that the payments will be effected without the slightest difficulty. While the whole country was greatly stunned by the catastrophe, which was characterized by most distressing details, the markets soon regained equilibrium after the first shock was felt. Events of the month have emphasized what was said in April respecting the improvement in the tone of business, and the greater confidence felt by people generally. This tendency has been reflected in the betterment of the steel trade, the more satisfactory showing of bank clearings at points outside New York, increased inquiry from mercantile borrowers, and the broader demand for investment securities of the first grade. During the last four weeks about \$200,000,000 in new security issues have been announced apart from the New York City \$65,000,000 4½ per cent loan which the public will bid on May 7 next. These new security issues have-



## The National Lime Manufacturers' Association

Meets Semi-Annually.

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### NEW YORK LIME NEWS.

New York, N. Y., May 13.—Coincident with improved building operations here in the East, which are, by the way, better than they were since August, 1911, there has been a fair degree of activity noted in the lime trade during the past month and the trade in general has shown steady signs of expansion. Prices are holding well and deliveries are going forward against old contracts in a satisfactory way. New contracts are coming along nicely and lime dealers expect considerable activity from now on, as building operations up to the present writing show no signs of a let-up.

Foster F. Comstock, president of the Comstock Lime & Cement Company, stated: "A slight improvement was noted in the volume of consuming inquiries and business has shown a moderate expansion in the local lime market during the past month. Builders are waiting for better weather than we have had during the past month before commencing new work. I am of the opinion that we will do a good business in the lime trade during the summer months."

J. A. Curtin, of the Farnham Cheshire Lime Company, in speaking of the local lime trade said: "Business has been going along on a fairly active basis, and during the past month a strong tendency has shown in the demand for lime, and now that we are getting better weather we look forward to picking up a good amount of business in the near future."

E. B. Morse, of the Frank E. Morse Company, reported conditions similar to those of his competitors. Business has been fairly active during the past month and the general market has shown signs of expansion and now that the weather conditions are more favorable building operations in the East will be prosecuted on a larger scale, which will be of ultimate benefit to the materials trade.

### PITTSBURGH LIME NOTES.

The limestone quarries of Western Pennsylvania have made all arrangements for a big run this summer. Many of them have increased their equipment and all of them have their plants in the best of shape now. The prospects for large sales of crushed limestone for county road work are excellent. Very little of this work has been let so far owing to the weather, and bids are being taken now on a large amount of work that will be started within the next ten days. Eastern Ohio will do more road work this year than last. The state road jobs in Pennsylvania will hardly be under way before midsummer, and in Allegheny county there will be considerable less road work done than last year, so that inquiries from this source are not expected to exceed the 1911 limit. Sales of agricultural lime this spring are reported very large in spite of the bad roads which held up hauling for a long time.

The Carbon Lime Stone Company of Carbon, Pa., which is owned by capitalists of Youngstown, O., has agreed to furnish free all the limestone needed for St. Elizabeth's Hospital.

An option has been taken by Eastern capitalists on the Stausmire farm near Gibsonburg, Ohio, and it is expected that an independent lime plant will be built there in the next two weeks. The limestone deposit there is very fine and several large quarries are now in operation near by.

A strike at the Johnson limestone quarries at Hillsville, Pa., caused some commotion last month. The trouble was that the workmen wanted to choose their own labor bosses.

The National Mortar & Supply Company is running its limestone plant at Gibsonburg, Ohio, at full headway and reports excellent sales of agricultural lime this spring.

### MAKING LIME PUTTY.

One of the foremost lime experts of New York recently remarked that the proper drawing off of lime had come to be a lost art and that, for this reason, the results obtained in the mortar used around the metropolis district were so unsatisfactory as to dispense with the lime specifications entirely. Now here is a pretty how-to-do. There is no use of referring, as in this instance, to the conditions of the characteristics of the laboring man now employed in building operations as compared with the predecessors of several decades ago when the production of lime putty at the building operations was more successful not only in this great metropolis district but everywhere else. In the same connection it was said that so long as the Irishman presided over the mortar box a lime putty was made which commended itself to the resultant market for plasticity and bonding power, which is the all-desired element for masonry purposes. But, now that the Italian, Roumanian, and the Polack emigrant is doing this kind of work, he does it less efficiently than the Irishman does it.

This is not the explanation, but the impatience of the American builder to use his material the minute it gets to the job and have it practically used up by the time he has to pay for it. This and this alone is to blame for the condition.

Let us look at the physical conditions involved. Lump lime as it comes from the kilns is the most receptive product that is known. The minute it is burned the process of recarbonation begins and it continues without cessation until the lumps of lime have reabsorbed carbonic gas sufficient to convey it back into the original limestone whence it came, so that the value of the lime is transitory and it can be conveyed into putty only by the application of water during the period of little or no recarbonation has occurred. Fresh lime, that is to say, lime burned forty-eight hours will make, under proper care, practically a perfect putty in about ten days, but it would not injure it at all to go to sixty days. The same lime three weeks past the drawing would not make as good putty in three weeks as the fresh lime would in ten days, and so on ad infinitum.

Now, we all know that it is common practice in New York, Chicago and every other market in this country, to have a wagon load of two tons of lime hauled to the job in the afternoon and have the putty drawn from that lime the following day by noon, and, very often, it is used within an hour after it is received and water first put upon it while the big lumps are separating into little ones and the little ones are taking up the water with rapid expansion. This is not an editorial yarn but actual observation of the mortar pallet made in the city of Chicago within the last three days. When the mason rubbed his trowel into the pile of mortar on the pallet, the lime was still in particles as big as chestnuts and making miniature volcanoes that looked like Aetna without the black smoke. Such a mortar was in use on at least fifty pallets in laying the curtain walls of a big club house building in the city of Chicago. Now, this is the condition which will get the material condemned. It is impossible for such a mortar to make a satisfactory job. The explanation in this particular case was to the effect that the lime had to be teamed about four miles and it took so long for it to arrive on the job that they could not wait any longer so they just shoveled it into the mortar with the result above stated.

Now there may be some other way than previously hydrating the lime to make lime which is used in building operations in our great cities, under present conditions, but the writer has never had the information brought to his notice. The factory proposition of building materials is a part of modern construction development. Lime is just as essential as it ever was, in fact, as the use of Portland cement increases in the mason's mortar just so much more is emphasized the putty value of the lime. A good hydrate lime, as it is produced in this country today in many instances and by numerous manufacturers, will make a putty which is just about perfection in ten to fifteen hours and there is no way to make an equally good putty in such a space of time. We have reached that stage in the development of the building industry and in the lime industry when nothing else than a pure hydrate can be successfully offered to the mason contractor who knows when he gives his order that the lime that he uses in his mortar has got to be prepared within fifteen hours from the time it goes on the pallet boards and over the

trowels. Just as soon as the lime industry is unanimous in this opinion and acts upon it and unanimously teaches the contractor that he can get quality which his work demands in no other way then there will be no complaint about the lack of lime specifications in New York or elsewhere. We have got to be up to the times. We have got to deal according to the rules or we will become back numbers and will be ruled out of the game.

The Wisconsin Railroad Rate Commission, in the case of the Waukesha Lime & Cement Company of Waukesha, Wis., against the Chicago, Milwaukee & St. Paul and the Chicago & Northwestern railroads, has ordered the roads to substitute a new scale of rates on gravel, crushed stone and lime in carload lots between Waukesha and other Wisconsin points.

In the case of the Eau Claire Concrete Company against the Omaha and Soo lines, the commission has decided that the rates on brick, recently ordered by the commission, affect also the rates on concrete blocks. A similar petition against the Chicago, Milwaukee & St. Paul road was dismissed.

The hydrating plant of the Shasta Lime Products Company, operated in conjunction with the Noble Electric Steel Company at Heroult, Cal., was destroyed by fire, together with the woodwork surrounding the lime kilns, early last month. W. H. Mead is manager of the company. It is announced that the plant will be rebuilt at once.

Every little while there is an opportunity in the lime business. One is to be found in the Classified advertisement department of the present issue of Rock Products. It is a lime proposition that will make a real lime man take notice.

William E. Carson, the cannon ball president of the National Lime Manufacturers' Association, recently remarked: "Business is fair and politics only making small excitement. Taft and Roosevelt are both trying to prove their characters while Wilson and Clark seem to be trying to disprove theirs. Harmon, the man from Ohio, is pretty well blackmailed, and it looks as if the star of hope is settled on Underwood, because he is the only specimen for presidential timber who has nerve enough to come out and declare for currency reform." So you see that this spotlight lime magnate of ours is just as active thinking for the whole country as he is for the lime industry.

### WELLER MANUFACTURING CO.

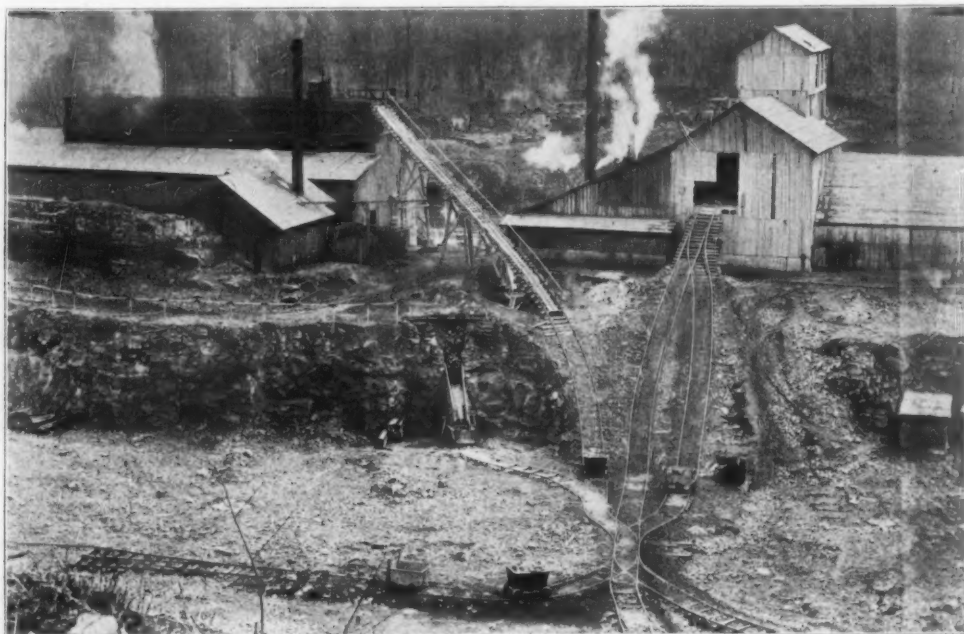
We introduce our readers this month to the Weller Manufacturing Company. This company has an extensive plant on West North avenue in Chicago, and are manufacturers of complete hydrating systems. Hydrated lime is forging its way ahead and the consumption of it is rapidly increasing in all sections of the United States. Retailers of building materials everywhere are being attracted to it as a material easy to handle and which gives the utmost satisfaction. Users and contractors are rapidly becoming educated in its use, so that the market is constantly on the increase and now hydrating plants are in demand in many sections. The Weller Manufacturing Company's system of hydrating is shown on another page in this issue. This company has a staff of mechanical engineers who are prepared to co-operate in all problems pertaining to complete systems, including crushers, conveying systems, etc. The Weller hydrator has features that are peculiarly distinctive; for instance, it has an adjustable feed and also an absolute regulation of the water supply. It is light, but of very strong construction, which feature assures the economy of installation, etc., as something that is to be desired wherever machinery is to be put in. This company also makes hydrators of any capacity. They are also manufacturers of the Weller conveying and power transmission machinery and other lines of equipment that our readers are interested in.

The Thomas C. Gage Company of Chicago has been incorporated with capital stock of \$10,000 to do building and contracting. The incorporators are Thomas C. Gage, F. A. Heffernan and F. M. Lowe.

The M. L. Austin Company of Cleveland, Ohio, has been incorporated to do general contracting. The incorporators are Milford J. Austin, John S. and Vernon Weekly, August Swanson and Ida J. Austin.

The Alex M. Knauber Company of Oak Park, Ill., has been incorporated with capital stock of \$1,500 to do general building, construction and contracting. The incorporators are M. Knauber, John H. Passmore and Fred S. Abraham.

# A MODEL LIME PRODUCING PLANT



SCENE AT THE ROCK LICK PLANT.

Geologists give the name Mitchell limestone to one of the lower carboniferous limestones, which overlies the Bedford limestone and forms the surface rock of an area three to twenty-five miles in width, extending through southern Indiana. Mitchell limestone is a fine grained crystalline stone and is quite hard. It is a remarkably pure carbonate of lime and is in every way suitable for mortar making and for chemical use where purity of the material is necessary. The stone has been used for lime manufacture ever since the pioneer days in the state and at Mitchell, a town which takes its name from the stone, on a commercial scale for over sixty years.

In the early days it was largely used for mortar work and sold to those who used it for building. Today Mitchell lime stands pre-eminent as a chemically pure product and is used by many of the largest manufacturers in the United States.

At various places this stone is manufactured into lime but nowhere on such a large scale as by the Mitchell Lime Company, whose vast quarries and plants are situated at Mitchell, Ind.

Various limes which show the same analysis and physical characteristics vary greatly in chemical use. Mitchell lime has been found to be especially desirable for many uses. The company enjoys a greater trade among sand lime products manufacturers than any other lime. This lime combines to form calcium silicates of greater strength and permeability than any other product and practically all sand lime brick factories in the central west use Mitchell lime exclusively.

has come a development in the source of supply,

The first kilns were of the temporary ground-hog pattern. These were in time replaced by the intermittent burning pot kiln. Asa Erwin operated a number of these pot kilns over fifty years ago.

John Collett in his report on the geology of Lawrence County, published in 1873, says "Mitchell lime is favorably known to the trade of Asa Erwin, who operates on the branch of the Rock Lick creek, using a common kiln capable of burning 1,000 bushels at a time. His annual output is 17,500 bushels. The product is a white lime which works hot and is found to be nearly equal to cement for foundations. The stone on account of its porous nature is found to burn and slack with great certainty." The Big Four Lime Company also operated for a number of years six pot kilns on the Rock Lick creek.

In 1895 the Mitchell Lime Company was organized and purchased the lime plants operating at Mitchell. The output of Mr. Erwin, as given, is quite in contrast with that of the Mitchell Lime Company today. The combined plants of this organization produce over 700,000 bushels of lime annually. Development in industrial lines has brought chemical lime into prominence as a base for many products.

The Mitchell Lime Company has kept pace with the progress in the uses of lime and is today supplying as many varieties of trade as there are uses for lime.

With the necessity for a chemically pure product

and the Mitchell Lime Company is probably as well known today as a manufacturer of this character of material as any other lime manufacturer in the United States. It has gained this position by producing and maintaining a high standard, and turning out a uniform product to be depended upon at all times.

Two modern plants make up the equipment of the Mitchell Lime Co. One of these, known as the Rock Lick plant, is located on the branch of the B. & O. S. W. Ry. known by that name. It is about a mile northeast of the town. This is near the site of the old pot kilns, the remains of which are still to be seen. This plant consists of six steel shell kilns, each with a capacity of 250 bushels of lime per twenty-four hours.

The present owners of the property have given especial attention to the development of the quarry as the former operators were working but a small face. In the past two years the quarry face has been pushed to the east through the hill several hundred feet, and borings made showed that the high grade stone extended several feet lower. The quarry floor was lowered by several feet until now the open face is over a hundred feet deep. Recent tests made has led the company to extend the quarry toward the west, and it has been gratifying to find that certain ledges of white stone show an increasing thickness, indicating that the original quarry was opened where the better beds were nearly pinched out or only had a thickness of a few feet. White stone ledges which formerly were but two to three feet deep are found in the prospecting to dip into the hill and show thicknesses of from twelve to fourteen feet. While there is but slight variation in chemical analysis of these various ledges, the appearance of the finished lime is different. The difference is in color and texture. The darker lime is coarser grained and close attention is given the selection of the various ledges.

An average of the analyses taken from the ledges in this quarry shows the stone runs as follows:

Calcium carbonate.....	96.60%
Magnesium carbonate.....	1.32%
Silica .....	1.20%
Iron and alumina.....	.24%

The company gives very close attention to its operating department. In taking stone from the quarry the quarriesmen pick the various ledges, selecting it for the lime plant. Nothing but clean pieces of rock are allowed to go to the kilns. The darker stone from the ledges is separated and run to the crushing plant.

After the lime is loaded into the kilns it is thoroughly burned. Coal is used to produce a gas for burning so that the lime does not come in contact with the coal. To temper the fire and produce a better gas, steam is introduced into the fire box. The lime is drawn at intervals of four hours. When taken from the kilns and while spread on the cooling floor it is inspected. All pieces which indicate overburn or core are eliminated and thrown out. Thus only the best pieces of lime are allowed to go out of the plant. The company has adopted the policy of running specified kilns for certain customers whose tonnage is large. This assures the consumer of a uniform lime, as the men operating the kilns become better acquainted with the requirements.

Two years ago this plant was destroyed by fire and rebuilt with many improvements, including concrete construction wherever possible.

In conjunction with the manufacture of lime a crushed stone plant is operated. The stone from the quarry not available for lime burning is conveyed to the crushing house. Here it runs through a number six and two number four Gates crushers. This plant is run to full capacity, as a ready outlet for the crushed stone is at hand. A number five Gates crusher is on the ground ready for installation at the earliest possible time. This will increase the output considerably. A Gardner crusher is now being installed. This machine will be used to grind lime as well as pulverize stone to supply the demand created for this grade of material.

Two and a half miles north of Mitchell, on a spur of the Monon railway, is located the Rabbitsville plant. Here the same policy is pursued regarding the selection of rock to be used in lime burning. The quarry is located south of the kilns and the floor of the quarry is on the level. Below the stripping a layer of blue stone overlies the ledges of rock. These show but little variation in chemical analysis and are remarkable for purity in carbonate of lime.



RABBITSVILLE PLANT OF THE MITCHELL LIME CO.

The average of the analyses taken from the ledges in this quarry shows that the stone runs as follows:

Calcium carbonate.....	96.65%
Magnesium carbonate.....	1.20%
Fearie oxide and alumina.....	.24%
Silica .....	.67%
Insoluble .....	.90%

The stone burns to a pure white lime and is much desired by chemical concerns on account of this. A test recently made on a car of lime from this plant by a customer showed the lime as follows:

Calcium oxide.....	96.94%
Magnesium oxide.....	.58%
Silica .....	.80%
Iron and alumina.....	.50%

This is a remarkable showing as the test represented the average car. The quarry at this place is being pushed into the hill and the same high grade deposits are found.

The Rabbittsville plant consists of six steel kilns of the most modern type. The stone is run up the tramway in cars and loaded into bins. Here the same methods in manufacturing are pursued as at the Rock Lick plant, which is the reason this material is so much desired.

The users of Mitchell lime have made so many and such persistent calls for this material in hydrated form that the company is now having its engineering department prepare plans for a modern hydrating plant.

The officers of the Mitchell Lime Co. are as follows:

President, Harry C. Trexler, Allentown, Pa.; vice-president, E. M. Young, Allentown, Pa.; secretary and treasurer, J. W. Bateman, Mitchell, Ind.

The operation of the plants is under the supervision of Daniel E. Ritter.

W. H. Weitknecht is superintendent, and Edw. Eckerburg, chemist.

The sales office and accounting department occupy part of the fifth floor of the People's Gas Building, Chicago. The general sales manager is Bernard L. McNulty, and W. E. Viets has charge of the accounting.

The company reports that the demand for Mitchell lime is taxing its present capacity, as its reputation extends over a great territory.

## JUST A MATTER OF SPECIFICATIONS

There was a time when lime was just lime. It was sold in the barrel for fertilizing, mortar and sometimes a specific use like tanning purposes, but as the scientific manufacture of all kinds of chemicals became practically a trade of its own, the chemist took his place in the manufacturing lines and he carefully analyzed the component parts of every mixture and made his requisition accordingly.

In selling the product of the lime kiln one of the weaknesses of the industry in the past has been they just sold lime, but in their anxiety to get an order they were willing to promise 101 per cent calcium or any other ridiculous specification, and the result has been that they have spoiled customers and have not been able to live up to any of the specifications. If some buyer came along and said he wanted a certain analysis, so much calcium oxide—as it was a new line of trade the manufacturer swallowed bait, specifications and all, and the tendency has been all the time to follow the consumer's and the chemist's specifications and oftentimes orders have been taken when the lime manufacturer could not live up to the specifications. If he went ahead and shipped something else he was in bad forever with this new customer. If he was able to meet the specifications on a certain run of stone and in two or three months

opened up a new quarry and found a different analysis, he was up against the problem of delivering what he sold. A ledge of stone may change in a day and they are liable to get a poor run of lime out at any time.

The National Lime Association has been very beneficial in educating the lime manufacturer to the technique of the game, but there is a long road ahead of the scientific operator of the lime kiln, and the selling of its product for specialties that are being furnished in various mechanical work now-a-days for as many specifications as they have orders.

The result is the lime manufacturer really does not know what he is up against until he delivers the goods. Those manufacturers of lime who cater to special lines should get together on this proposition and discover, if possible, the needs of their newly found customers and standardize their methods of determining analysis as well as all specifications, so that the opportunity will be lessened for errors in deliveries of goods either by increased quantity of one component part or other theories which some chemist, who is temporarily analyzing the product of the lime kiln may be accountable for, and two manufacturers catering to the same trade may not be furnishing the same goods and get themselves in all kinds of trouble in this business.

In other words, there should be a standardization of specifications and an understanding between the buyer and the seller as to the product that is to be furnished. If that cannot be determined, the consumer should pay for special specifications on a particular product.

If the specifications are to be considered or if analyses are to be taken of shipments, let the analysis be taken at the time of manufacture of the lime and not after the car has been in transit and subjected to delays, elements, leaky cars, lying around a terminal five or six days and other causes over which the shipper has absolutely no control, which necessarily makes a great deterioration of the product.

By considering this matter and conferring with your competitor as well as your customer a standardizing method of handling this class of trade can be adopted and it will be much more satisfactory to all concerned, and the superintendent of the lime plant will know exactly what he has to furnish.

As this is practically a new branch of the industry and naturally subject to a larger increase in volume year by year, as well as a more scientific requirement in the product of the quarry, the lime manufacturer must protect himself now or suffer for his lack of interest, in years to come.

## SPRAYING FRUIT TREES WITH LIME

The United States Department of Agriculture has issued a timely bulletin to farmers on the Enemies of the Fruit Tree. The bulletin includes some good suggestions on the use of lime in combating these enemies of the apple and other fruits. This is just the time of year when any such treatment as that outlined is to be given the trees, and the retailer who sells lime undoubtedly is being asked questions by farmers and other owners of fruit orchards on the methods to be pursued. The several troubles to which the apple tree and other fruit trees are subjected are for the most part satisfactorily controlled by a thorough use of sprays. During the past few years there have been important improvements in the field of orchard spraying as regards the materials used and also in the character of machinery employed. At the present time orchardists, by careful attention to details, are able to obtain a much higher benefit from spraying operations than formerly, and while results vary, depending upon weather and other conditions, yet the successful orchardist now expects to harvest, as sound fruit, from 90 to 95 per cent of his crop. Below are given the spray materials recommended in the present bulletin, with directions for their preparation.

### Lime-Sulphur Solution.

Uses—Fruit growers have now become quite familiar with lime-sulphur sprays as a remedy for the San Jose scale, peach leaf-curl and blister mite, and other troubles requiring dormant tree treatment. The lime-sulphur wash, as used on dormant trees, has gone through a good deal of evolution since the California formula was first employed in the East. Whereas a few years ago it was the practice to make the wash at home for immediate use, utilizing for this purpose in many cases very large cooking outfits, the tendency at the present time is toward the employment of the commercial lime-sulphur solution, a concentrate which is kept indefinitely and use as needed, or a similar home-made solution, both of which are prepared on a distinctly different formula from the wash as formerly used.

A distinct advance was made in the control of fungous diseases when it was found that these commercial and home-made lime-sulphur concentrates, properly diluted, could be used with satisfactory results as fungicides on trees in foliage, replacing Bordeaux mixtures, the use of which is attended with danger of russetting the fruit and injuring the foliage, depending upon weather conditions.

Home-Boiled Lime-Sulphur Solution — Concentrated lime-sulphur solution, to be diluted and used for the summer spraying of orchards, may be prepared by boiling together for about 50 minutes, 100 pounds of sulphur, 50 pounds of lime, and water to make 50 gallons of concentrated solution. Any finely powdered sulphur of 98 to 99 per cent purity may be used. The commercial ground sulphur is the cheapest form and is as good as the flowers or flour for that purpose. The best grade of fresh stone lime is required for the best results, although a good grade of hydrated lime may be used, provided proper allowance is made for the high percentage of moisture it contains.

The boiling may be done in barrels or vats with steam or in kettles over a fire. An ordinary 75 to 100 gallon food cooker composed of a kettle with jacket and fire box is perhaps the most convenient and economical outfit for small and medium sized orchards.

Place about one-fourth of the required amount of water in the kettle, bring it to the boiling point, then put in the lime and immediately add the sulphur. Stir vigorously until the lime is slaked, then add sufficient water to finish with 50 gallons of the concentrated solution and boil for 50 minutes. The total time of actual boiling should not exceed 1 hour, and, as a rule, a boiling period of only 50 minutes gives better results. After the sulphur has gone into the solution, combining with the lime to form sulphides, further boiling brings about a chemical change which finally results in throwing some of the sulphur out of the solution to form a sediment. The sulphur should first be passed through a sieve to break up any lumps that it may contain,

and there is perhaps some advantage in working it into a thick paste with water before adding it, or the sulphur may be placed in the kettle first and worked into a paste before adding the lime. In order to finish with 50 gallons of solution the kettle should be filled to about 58 gallons, on account of evaporation. If the water evaporates to below 50 gallons more water should be added to make up the loss. A measuring stick with a 50-gallon mark, and other marks as desired, will be found useful in determining the amount of liquid in the kettle. When steam is used the process is about the same as above described. Owing to the condensation of the steam a somewhat smaller amount of water is required. When the boiling is finished the solution should be poured through a strainer of about 20 meshes to the inch, so as to remove the coarse particles of sediment. It may be used immediately or stored in barrels or other containers and kept indefinitely, provided the air is excluded. In practice the fruit growers, as a rule, have not been able to prepare the lime-sulphur solution without obtaining a large amount of sediment, and this has tended to make the commercial product more popular. This sediment is due largely to impurities in the lime and improper mixture and boiling. Straining will take out the coarser particles, and the remainder will not prove to be seriously objectionable.

After the sediment has been settled, the clear liquid should test 25 to 28 degrees on the Baumé hydrometer. It takes about 2 gallons of the home-made preparation to equal in strength 1½ gallons of the commercial product, and these amounts, respectively, are the amounts required for each 50 gallons of spray. For the summer spraying of apple trees, lime-sulphur solution, whether home-made or commercial, should be so diluted as to contain 3½ to 4 pounds of sulphur in each 50 gallons of spray. Prepared according to the above directions, 1 gallon of the home-made product contains approximately 2 pounds of sulphur in solution, and therefore 2 gallons would give the requisite amount of sulphur for each fifty gallons of spray.

# Announcement

**Best Bros. Keene's Cement**  
now available in any quantity. Enlarged facilities now enable us to supply demand for this wonderful building material.

No more banged and battered walls—no more chipped corners—no more delicate color schemes ruined by free chemicals—no more falling plaster—just a sanitary, odorless and everlasting wall, column or decoration when you use this highest quality plastering cement.

Best Bros. Keene's Cement has been used with the greatest success for nearly a quarter of a century. It contributes to the sanitation and durability of many of the costliest public buildings and private homes in the country. The Senate Office Building at Washington, D. C., is one of a vast number of public buildings finished with this material.

Progressive Builders, Dealers and Architects everywhere are investigating the many peculiar advantages offered by Best Bros. Keene's Cement. You should know more about it.

*Drop Us a Line Tonight for Further Particulars*

**Best Bros. Keene's Cement Co., Medicine Lodge, Kan.**

ESTABLISHED 1889



## LOUISVILLE PLASTER NEWS.

Louisville, Ky., May 18.—The wall plaster interests of Louisville and Kentucky have thus far scarcely gotten a chance at what promises to be a notable business year in this part of the country. The fact of the matter is that construction work is just getting a start for 1912 in the Ohio valley. As a matter of course, it cannot be expected that the plaster trade will commence to get all that is coming to it until a goodly proportion of the work now under way has arrived at a stage where it will demand interior finishing.

The weather, an important factor in the building world, was execrable until a short time ago. The first week or two in May was featured by some of the coldest and most disagreeable weather that has ever graced the Falls Cities. But permanent settlement of sunshine and warmth is now the order of the day and within a month every plaster man will have all the business he can handle.

The 18-story office building of the Inter-Southern Life Insurance Company is the biggest and most immediate prospect in the array of "plums" confronting the plaster interests. The outside work upon the big structure has been pushed at an unusually rapid gait and is now almost completed. Besides the thousands of square feet of plaster to be set in this building, there are other pieces of feature work and a healthy amount of residence building that has already begun tops off the situation. By the first of June, at least, the plaster trade should be well along in a busy mid-summer schedule.

The strike of the wallplasterers' union, which tied up matters completely about a month ago has been settled. The plasterers walked out, demand-

ing shorter hours and \$6.00 per day instead of the \$5.00 wage scale formerly in force. The contractors were obdurate and refused to concede any important points, with the result that, for several weeks, the trade was bound in a knot of labor troubles.

The differences of the employers and the employees have been amicably adjusted, however. It was predicted that the striking contingent would not hold against the influx of summer work, and it is probable that the first evidences of a prosperous business season figured more prominently than anything else in bringing both sides to taw. Some minor concessions were allowed by the contractors. The plasterers are still receiving \$5.00 per day and a friendly feeling prevails once more.

The Kentucky Wall Plaster Company, according to B. J. Campbell, is now beginning a schedule of warm weather work which promises to equal, in every respect, the excellent record of last year. The Kentucky's jobs are just materializing at present, however, according to Mr. Campbell, and definite news of important work may not yet be announced.

The Atlas Wall Plaster Company is very busy with all the small work it can handle. Within a month, according to William Selke, who is president of the concern, the bigger jobs of the season should be in plain view and their approach will leave nothing more to be desired during the warm weather term.

"A very satisfactory state of affairs rules in the plaster trade at present," said the report of the Southern Wall Plaster Company. "We are booking new business almost every day and, now that the labor troubles of the early season have been closed satisfactorily to everybody concerned, there is nothing to do but to handle subsequent developments in a successful business year as they arise."

## MOUND HOUSE PLASTER COMPANY.

J. W. Vogelsohn, general manager of the Mound House Plaster Company, Monadnock building, San Francisco, reports that the large factory at Emery-

ville, Cal., has been in operation for about a month past, and is now in good running order, turning out Colonial wall board and hard wall plaster. He says the outlook is very favorable, as many domestic and foreign inquiries have been received, and the wall board is being taken up by both the Government and the State. The company will handle its own selling work for the present, but expects to have agencies at all important points as soon as the material is well established on the market. Plans are being made for the installation of a large calcining kettle in the Emeryville plant to supplement the plant at Mound House, Nev., and asbestos board is to be added to the output. Colonial wall board is now being installed in a \$10,000 bungalow in Oakland.

The Delac Plaster Products Company, of Caladonia, N. Y., recently broke ground for the plant it is to erect for the purpose of manufacturing fireproof wall board. The plant will be 100x700 feet, one story high, and is located on the P. L. railroad.

The National Plaster Board Company, Cleveland, Ohio, has increased its capital stock from \$10,000 to \$25,000. The company is considering moving its plant to Port Clinton, Ohio.

The Fire Proof Plaster Board Company, Chicago, Ill., has been incorporated, with a capital stock of \$2,500. Incorporators: R. R. Markley, J. W. Templeton and F. H. Brownell.

Work is progressing rapidly at the new plant of the Kelley Plaster Company, Sandusky, Ohio, and operations will begin in a few days. The main building is 265 feet long and 50 feet wide, and is of steel construction. The plant will have a capacity of 250 tons of crushed rock a day, in addition to the regular output of hard wall and finishing plaster.

The Fishack Gypsum Patent Plaster Company, of Toledo, Ohio, has purchased the William Busching Supply Company and is preparing to remove its headquarters to Fort Wayne, Ind., where it will have its main office and general sales department.

# CLAY

## BRICK MAKERS PETITION.

The Mack Manufacturing Company, Metropolitan Brick Paving Company, and C. P. Mayer Brick Company are petitioners versus United States of America, respondent, in the Commerce Court, in connection with a ruling of the Interstate Commerce Commission regulating rates but not awarding reparation.

On or about January 20, 1908, the petitioners among others instituted a proceeding before the Interstate Commission against the Pittsburgh, Cincinnati, Chicago & St. Louis Railway and others, "challenging among other things the reasonableness of the Chicago base rate of 22½ cents per 100 pounds on paving brick on eastbound shipments from Central Freight Association territory to Trunk Line territory and asking reparation."

Thereafter "on November 26, 1909, the Interstate Commerce Commission decided that the Chicago-New York base rate to be applied on paving brick shipments eastbound from Central Freight Association territory to Trunk Line territory should not exceed 21 cents per 100 pounds, and that any charge in excess of that amount is unreasonable, but that under all circumstances shown no order for reparation is warranted." The petitioners now seek to have the commissioners' orders set aside as set forth in case 2814. They wish the court to instruct the commission to require the defendants in the proceedings to make reparation of the excess found by the commission in its report of November 26, 1909, to be reasonable and just between the dates of January 20, 1908, and February 2, 1910, and for such other further relief as the petitioners may be entitled to in the premises.

## CASE IS SETTLED.

The case brought against the C. W. Raymond Company, a brick machinery manufacturing concern of Dayton, O., by the Fond du Lac Pressed Brick Company of Fond du Lac, Wis., for alleged breach of contract, has been settled. In December, 1911, the Fond du Lac concern started suit against the Raymond company, demanding the return of \$1,250 in money and a note for \$1,395, which had been given in payment of brick-making machinery. Damages to the extent of \$25,000 were demanded also, by reason of the alleged failure of the Raymond company to carry out the terms of its contract. On the eve of the trial, however, the defendants agreed to replace a large amount of the old machinery of the Fond du Lac plant with new equipment. By the terms of the settlement, the defendant company returns the \$1,395 note with accrued interest, substitutes an \$800 clay crusher for an old one and furnishes other new machinery to the value of \$500. The Fond du Lac Pressed Brick Company is reorganizing and will have its plant ready for operation by June 1.

An unusual shortage of brick at Racine, Wis., is reported by contractors in that city. There are more brick structures than usual going up in Racine this season and contractors have been forced to order heavy shipments of brick from Chicago.

## PITTSBURGH BRICK NOTES.

Brick men have not felt so good in the Pittsburgh district for four years as now. Their plants are running full or nearly so. Stocks are low, shipments are coming forward nicely and the demand for both building brick and pavers is fair to good in all lines. With good weather the brick companies anticipate a first-class trade all summer. Prices have not recovered their former level and competition is still so keen as to make many contracts almost unprofitable at the figures that are being quoted.

The Pennsylvania Clay Products Company, whose plant is located in Butler county, Pa., is shipping its full output of sewer pipe. Its inquiries indicate that it could sell considerably more if it had the product.

The Kittanning Brick & Fire Clay Company has its big plants at Kittanning, Pa., and Johnsonburg, Pa., running full. The country trade has picked up steadily the last few days and the outlook all around is for a better business than for four years.

The Pittsburgh-Callery Brick Company has its plant at Callery Junction on the B. & O. under fine running headway. Its officials report a smaller stock of brick this spring of any year in its history.

They are now making about 25,000 a day. Prices for face brick are just fair, but the Pittsburgh district is taking up most of the product.

The Somerset Contracting Company has been organized by Daniel E. Keller, Frank H. Zeigler and Richard Trevorrow of Somerset, Pa., and will do brick, stone and concrete work.

The Neshannock Brick Company at Volant, Pa., has resumed operations after being down several months on account of a fire. Several men will be employed during the next six months. The plant is thoroughly modern and complete at present.

Ralph M. Schory of Canton, Ohio, who recently purchased the Champion Brick Works at Wellsville at receiver's sale for \$24,666, two-thirds of the appraisement, has refused to take the plant over, and the court has ordered a new order of sale issued and the property will be resold.

## CLAY MAN IS MAYOR.

John Ringle, president of the Wisconsin Clay Manufacturers' Association and head of the Ringle Brick Company of Wausau, Wis., has been elected mayor of Wausau. In his inaugural address Mayor Ringle advocated the administration of affairs in his city along business lines and favored the issuing of bonds to take care of floating indebtedness and to put the city on a cash basis. The Ringle Brick Company has placed its plant in operation and plans to make an increase in output of at least 4,000,000 brick.

The John H. Black Company, of Buffalo, is making extensive alterations and improvements in its Jewettville brick and tile plants, and when completed will rank among the foremost in the country. Among this firm's large contracts are Shea's Theater, the Marine Bank's 17-story building, the Root Building, the All Saints' School and the New York Telephone Company's massive structure, aggregating close to \$1,000,000.

John J. Williams has purchased the Syenite Trap Rock Company, of Little Falls, N. Y., and operations will begin at once. A large number of men will be employed. The plant is considered one of the best of its kind in the state.

The Missouri Crushed Rock Company, of Kansas City, Mo., has been incorporated by S. R. Fest, R. E. Weesner and F. C. Kampff. The capital stock is \$100,000.

The Universal Crushed Stone Company, located at Ives, Wis., has authorized a bond issue of \$100,000 for the purpose of enlarging its plant-facilities and operating upon a larger scale.

The Charlevoix Rock Products Company, Charlevoix, Mich., finds the demand for its products equal to the full capacity of its mammoth plant. It has recently installed several carloads of new equipment. The company employs about 125 men.

The Marble Hill Crushed Stone Company, Joliet, Ill., has been incorporated, with a capital stock of \$15,000. Incorporators: Herman Greenberg, Albert E. Markgraf and John H. Savage, Joliet, Ill.

The South Shore Supply Company, Chicago, Ill., has been incorporated, with a capital stock of \$2,500, to deal in building materials and quarry stone. Incorporators: Charles J. Luck, William E. Rafferty and Edward Graff.

The crusher plant of the Marquette Stone Company, Marquette, Mich., is now in operation with a large force of men, manufacturing the crushed rock for the new dock at Presque Isle.

A large tract of land has been purchased at Bowling Green, Ky., by David Y. Johnson, T. L. Herbert and Robert E. Elliott, of Nashville, and they will operate a stone quarry on an extensive scale.

The Acme Crushed Rock Company, Los Angeles, Cal., has recently been incorporated, with a capital stock of \$100,000, \$70,000 of which has been subscribed. The directors are A. M. Hunter, P. A. Kalbaugh, W. F. Hunter, Richard Ingalese, C. B. Hunter, H. G. McClelland and Eugene Kalnough.

The Dolomite Stone Company has been incorporated, with headquarters at Rome, Ga., with a capital stock of \$2,000, and with the privilege of increasing it to \$10,000. The company proposes to quarry and crush stone, manufacture crushed stone products and deal in and develop mineral lands. Petitioners: Eugene Fies, of Jefferson county, Ala.; T. P. Stovall, C. S. Pruden and R. A. Denny, of Rome, Ga.

# QUARRIES

## PITTSBURGH CRUSHED STONE.

Stone firms as a rule are busy. Building stone has not come into demand quite so much as was expected, but the demand for road and bridge stone is good. Sales and prospects are both better than last year. It is evident that the quarries are going to have all they can do this season, for the work started so late that there is bound to be a rush in operations a little later on.

The Standard Lime & Stone Company of Baltimore is building a \$60,000 plant on the Western Maryland railroad near Bidwell, Pa. It will be completed about June 1. The stone is of a blue texture, suitable for building, ballasting and concrete. The plant will be operated by four boilers of 100 horsepower each, one powerful engine and one air compressor. The stone crushers will have a capacity of 800 tons per day. The company will also erect offices, stores and boarding houses and will employ at least 150 men. The plant is being built under the direction of C. M. Collins of Chicago and T. H. Cherry of Wilmington, Del.

The Cleveland Stone Company, whose Pittsburgh office is managed by George J. Senn, is getting more call for road stone now than anything else. Building has not made any great gain in the requisitions so far. Shipments are just beginning to start and the company's Amherst, Ohio, quarries are working full.

The Consolidated Stone & Mining Company is running its quarries in Lawrence county, Pennsylvania, at full capacity. It is crushing a large amount of stone for ballast and concrete work and is also quarrying considerable sand stone for curbing and road work. The demand for limestone just now is better than for any other grade. Sand stone does not seem to be wanted as much as last year. There has been an unusual demand for furnace stone the past few months. The Consolidated has worked its plant since the first of last October with only six days lay off, and is in splendid shape now. It has recently bought for about \$100,000 the Ingham property, near Rock Point, Beaver county, Pennsylvania, which includes a very valuable deposit of fine building stone.

The Winfield Mineral Company and the Winfield Sand Company have been consolidated under the title of the Winfield Sand & Mineral Company. B. C. McKee is treasurer and Walter K. Hood manager of the new concern. It will carry on the same sand business as before and will also do a large business in limestone, fire clay and coal, and a coal mine is already in operation. Later on the company expects to develop its gas and oil rights on its 1,700 acres. This property is on the P. R. R. and is valued at \$350,000. Its plants are now running full capacity and taking out 1,000 tons of material every day. Manager Hood reports the demand good in all lines and says the local outlook is especially promising.

The Clydesdale Stone Company, whose quarries are in Lawrence county, Pennsylvania, reports that state road work is tardy in being awarded and also that there is much less inquiry for Allegheny county road stone than last year. The same capitalists are identified with the Ellwood Sand Company, which is doing a nice business.

The Universal Crushed Stone Company has authorized a bond issue of \$100,000 for the purpose of funding the indebtedness of the company and for enlarging its plant at Ives, Wis.

The Wisconsin Stone Company, operating a quarry at Lannon, Wis., has been awarded a contract for supplying 40,000 yards of crushed stone for use on the Milwaukee streets. The company has installed another crusher at its quarry.

Kroll & Buezel, operating the Ripon Stone quarry at Ripon, Wis., have installed new motor power equipment.

The Monon Crushed Stone Company, of Monticello, Ill., is making improvements which will increase its capacity from 500 to 2,000 yards per day. The quarry will be enlarged by stripping two acres more of ground.

The Petoskey Crushed Stone Company, of Petoskey, Mich., has resumed operations after an idleness of several weeks. It is now shipping twenty-four cars of its product each day.

Hughes Bros. & Bangs, of Cleveland, Ohio, have opened the stone quarry near Ridgeway, N. Y., and will employ permanently about 200 men.

# SAND-LIME BRICK

## PRODUCTION STATISTICS.

The sand lime brick industry in 1911, as indicated by the figures which follow, showed a considerable decrease in value compared with previous years. The value of the production reported in 1911 was \$897,664, compared with \$1,169,153 in 1910, a decrease of \$271,489, or 23.22 per cent. The accompanying tables show the production of sand lime brick in 1910 and 1911, by states and kinds:

The value of the product decreased in 1911, as

shown by these tables, \$271,489, or 23.22 per cent. In 1910 this product showed an increase over 1909 of \$18,573, or 1.61 per cent. The number of states reporting in 1911 was 26. This is a net decrease of 2, Delaware, Montana, North Carolina and Virginia dropping out, and Connecticut and Massachusetts being added as producers. In order to avoid disclosing individual operations, it has been necessary to group certain states. Michigan in 1911, as from the first, except for 1906, was the leading state in value of output and reported wares valued at \$210,001; this was a decrease of \$30,648 from 1910, or 12.74 per cent. Michigan's product constituted 23.39 per cent of the total value of all sand-lime products in 1911, and 20.58 per cent of the total of 1910. New York was second in value of product, displacing Minnesota, which was third. Wisconsin rose from ninth in 1910 to fourth in 1911.

Of the states for which totals are given, but two

showed an increase—New York and Wisconsin. Of these, Wisconsin showed the larger increase—\$38,913, or 132.36 per cent. New York's increase was \$6,780, or 7.61 per cent. Minnesota, which showed the largest increase in 1910, showed the largest decrease in 1911, \$60,576, or 39.23 per cent.

Michigan continues to have the largest number of operating firms reporting—10 in 1911, the same as in 1910. New York was next with 8 operating firms reporting, an increase of 1. Minnesota showed a decrease of 1, and Wisconsin reported 4, the same number in both years.

The average price per thousand for common sand-lime brick was \$6.09 in 1911, as compared with \$6.36 in 1910 and with \$6.39 in 1909; for front brick it was \$9.53 in 1911, as against \$10.90 in 1910 and \$11.98 in 1909. In 1911 common brick yielded 91.92 per cent of the value of all products; front brick 7.85 per cent, and all other products 0.23 per cent; in 1910 these percentages were 87.57, 10.53 and 1.90, respectively.

## NEW YORK RETAILERS.

New York, N. Y., May 13.—Improvement in the local building material market was noted during the past month, and dealers report that a strong undertone in the demand for materials had developed. Builders are now awaiting the advent of good weather to commence building on a large scale. Dealers report the business that is coming to hand now to be of a fairly large volume, and expect with better weather conditions a large increase in the demand for materials. The Borough of Brooklyn has continued to show the most activity in building operations, but during the past two weeks Manhattan has shown signs of awakening and more work is being commenced each day. The prospects are bright for a good amount of business to be done in the building material line during the next couple of months; at least this is the opinion of a number of dealers.

Wright D. Goss of the Empire Brick and Supply Company had the following to make concerning the building materials market: "A late spring has retarded the demand for building supplies considerably and to date business has been quiet. The rainy weather during the past ten days also helped to postpone work on building operations. Inquiries are of a healthy nature and we expect with favorable weather a marked improvement in building conditions. A number of big jobs are being figured on, but they are slow in awarding contracts. Prices are somewhat stiffer. The prospects are good for the building season."

A representative of the John P. Kane Company reported that the volume of business was fairly good during the past month. Prices showed a tendency to stiffen somewhat. The late spring and rainy weather has thrown a wet blanket on the building material trade and there has been very little doing consequently. They expect by the first of June that business will improve noticeably.

William C. Morton, of the Consolidated Rosendale Cement Company, had the following to say regarding the local building material line: "The demand for Rosendale cement was very active during the past month and we were simply unable to deliver the goods ordered, as the demand was greater than our output. According to dealers with whom I have spoken business conditions have improved during the month and the general awakening has been noted in all building material lines. We look for a continued good business during the summer months. On April 1 we advanced the price of Rosendale cement from 80 cents to 85 cents at mill in bulk."

E. B. Morse, of the Frank E. Morse Company, in speaking of the local building trade said that the moderate demand for building materials was noted in the local market during the past month. This state of affairs has been caused by the inclement weather of the interval and it has also retarded building to a large extent. The demand for cement and lime was quiet but steady with no change in prices. Plaster prices have advanced somewhat. A couple of weeks of good weather would be the cause of awakening of building operations and improving of business generally.

M. Wilson, of the Clinton Point Stone Company, reported the crushed stone situation as follows: "The demand for crushed stone during the past month continued good and up to the present time almost our entire output is contracted for. Prices remain steady. The rainy weather has greatly retarded various operations and we are behind in our deliveries. The prospects for a good business during the year are very bright indeed."

The A. D. Thompson Company of Peoria, Ill., has been incorporated with capital stock of \$25,000 to do contracting and construction work. The incorporators are W. T. Irwin, C. V. Miles and Robert P. Jack.

State.	Number of operating firms reporting.	Common brick.		Front brick.		Fancy brick.		Miscellaneous, value. <sup>a</sup>	Total value.
		Quantity (thousands).	Value.	Quantity (thousands).	Value.	Quantity (thousands).	Value.		
California.....	5	3,094	\$27,368	1,097	\$16,144	.....	.....	.....	\$43,512
Colorado, Idaho, Montana, and Washington.....	6	5,786	52,724	2,676	38,054	105	\$3,757	.....	94,535
Delaware, District of Columbia, Maryland, North Carolina, and Virginia.....	7	3,224	25,751	(b)	(b)	.....	.....	(b)	42,455
Florida.....	4	12,685	77,950	(b)	(b)	.....	.....	.....	85,450
Georgia and Mississippi.....	3	3,606	20,489	(b)	(b)	.....	.....	.....	24,146
Indiana.....	5	13,869	63,134	(b)	(b)	.....	.....	.....	63,534
Iowa.....	3	(b)	(b)	(b)	(b)	(b)	(b)	(b)	31,269
Kansas, Nebraska, North Dakota, South Dakota, and Texas.....	7	17,440	132,827	831	9,289	.....	.....	.....	142,116
Kentucky and Ohio.....	3	5,232	32,050	.....	.....	.....	.....	.....	32,050
Michigan.....	10	37,648	218,627	(b)	(b)	.....	.....	.....	240,649
Minnesota.....	5	22,444	145,705	544	7,345	(b)	(b)	.....	154,250
New Jersey.....	3	1,512	9,254	(b)	(b)	(b)	(b)	.....	23,811
New York.....	7	14,647	89,150	.....	.....	.....	.....	.....	89,150
Pennsylvania.....	4	11,854	72,827	(b)	(b)	.....	.....	.....	72,827
Wisconsin.....	4	4,426	29,055	(b)	(b)	.....	.....	.....	29,399
Other States <sup>c</sup> .....	.....	3,513	26,906	6,156	52,342	118	4,113	\$14,202	(d)
Total.....	76	160,980	1,023,817	11,304	123,174	223	7,870	14,292	1,169,153
Average price per M.....	.....	.....	\$6.36	.....	\$10.90	.....	\$35.29	.....	.....

<sup>a</sup> Including door and window sills and building blocks.

<sup>b</sup> Included in "Other States."

<sup>c</sup> Includes all products made by less than three producers in one State to prevent disclosing individual operations.

<sup>d</sup> The total of "Other States" is distributed among the States to which it belongs in order that they may be fully represented in the totals.

## Production of sand-lime brick in the United States in 1911, by States and kinds.

State.	Number of operating firms reporting.	Common brick.		Front brick.		Miscellaneous, value. <sup>a</sup>	Total value.
		Quantity (thousands).	Value.	Quantity (thousands).	Value.		
California.....	4	(b)	(b)	980	\$11,495	.....	\$19,535
Colorado, Idaho, and Washington.....	5	3,795	\$30,008	613	7,995	.....	38,003
Connecticut, District of Columbia, Maryland, Massachusetts, and Pennsylvania.....	7	12,420	76,808	(b)	(b)	(b)	80,830
Florida.....	3	9,266	51,266	(b)	(b)	.....	56,274
Georgia, Kentucky, Mississippi, and Ohio.....	5	10,306	59,765	(b)	(b)	.....	66,325
Indiana.....	3	10,192	45,891	.....	.....	.....	45,891
Iowa, Kansas, Nebraska, North Dakota, and Texas.....	7	8,361	68,994	(b)	(b)	.....	73,584
Michigan.....	10	32,889	192,224	2,726	17,777	.....	210,001
Minnesota.....	4	15,957	89,569	272	4,075	(b)	93,734
New Jersey.....	3	1,314	8,716	674	8,994	.....	17,710
New York.....	8	15,547	93,980	(b)	(b)	.....	95,930
South Dakota.....	3	4,200	31,535	.....	.....	.....	31,535
Wisconsin.....	4	10,238	68,312	.....	.....	.....	68,312
Other States <sup>c</sup> .....	.....	1,087	8,046	2,126	20,130	2,090	(d)
Total.....	66	135,572	825,108	7,391	70,466	2,090	897,664
Average price per M.....	.....	.....	6.09	.....	9.53	.....	.....

<sup>a</sup> Including blocks and trimmings and fancy brick.

<sup>b</sup> Included in "Other States."

<sup>c</sup> Includes all products made by less than three producers in one State to prevent disclosing individual operations.

<sup>d</sup> The total of "Other States" is distributed among the States to which it belongs in order that they may be fully represented in the totals.



NATIONAL ASSOCIATION OF SAND AND GRAVEL PRODUCERS.

Meets Annually.

#### OFFICERS.

F. W. Renwick, Chicago Gravel Co., 343 S. Dearborn St., Chicago, Ill.	President
H. H. Halliday, Halliday Sand Co., Cairo, Ill.	First Vice-President
W. F. Bradley, Ohio & Michigan Sand & Gravel Co., Toledo, Ohio.	Second Vice-President
H. F. Curtis, Lyman Sand Co., Omaha, Neb.	Third Vice-President
Lee R. Witty, Wabash Sand & Gravel Co., Terre Haute, Ind.	Fourth Vice-President
J. J. Neary, Utica Fire Sand Co., Utica, Ill.	Fifth Vice-President
C. H. Brand, Atwood-Davis Sand Co., Chicago, Ill.	Treasurer
B. F. Lippold, Chicago, Ill.	Secretary
C. H. Stebbins, N. C. Fisher, A. Y. Reed, P. A. Stewart, T. E. McGrath, G. W. Bunker,	Directors for two years
	Directors for one year

#### THE STANDING COMMITTEES.

C. H. Stebbins, W. F. Bradley, P. M. Lewis, Joseph Hoch, H. C. Cary, C. B. Sheffer,	Uniform Classification
P. M. Lewis, E. S. Davis, W. F. Bradley, R. Snoddy,	Transportation
R. Snoddy, W. C. Jones, H. C. Cary,	Co-operation

Official Organ.....Rock Products

#### LOUISVILLE SAND NEWS.

Louisville, Ky., May 18.—If you could secure a birdseye view of the sand industry in the Bluegrass State at present, you would see that from Maysville to Paducah and southward through the inland territory of that commonwealth, there isn't a digger which is not spurring jets of steam viciously as it strives with might and main to scoop enough silicate from the river beds or the pits to serve the building interests to which it caters. For the sand trade is just now getting a touch of the fine business which will prevail full force until next October or November.

The present activity of the sand men is the resultant of only the past couple of weeks. Prior to May 1 there was very little opportunity for booming business because of the fact that weather conditions depressed the building world extremely. It has been only within the past fortnight that concrete work could be pushed ahead with the vigor and vim which are characteristic of a big season with the structural interests.

Now that the trade is fairly started, there will not be the least diminution in orders and deliveries for months to come. The summer of 1912 promises to be equally as productive of business as that of 1911 which, as everyone identified with the building trade has occasion to remember well, was a record-breaker in the annals of the Gateway City.

The Ohio River Sand Company, one of the biggest concerns in the local trade, is inclined to view the situation very optimistically. This attitude on the part of the big company is encouraging. For the past few weeks the Ohio River diggers have not lost an hour's time, for a series of deliveries is now on which will equal that of any similar period in the history of the establishment.

A feature of prime importance with the Ohio River interests at present is the new City Hospital in Louisville, which is being erected at a cost of \$1,000,000. This institution is of concrete construction throughout, comprising eleven main buildings, and thousands of yards of Ohio River sand are being consumed. This leading job will

demand the attention of the sand men during a greater portion of the entire summer.

The Nugent Sand Company, according to the report of one of its members, is very busy at present and does not anticipate any slackness in its affairs for the remainder of the summer. A new derrick has been installed at the Nugent yard on the river front, which easily handles 1,000 yards of sand per day, thereby considerably increasing the capacity of the plant to meet constantly growing demand.

In addition to a host of small work, the Nugent company is delivering to Swift & Company, the general contractors of Chicago, who are handling extensive concreting work for the Illinois Central Railroad Company at its local terminus. The erection of a concrete umbrella-shed at Union Depot has been completed and a wall of concrete is now being run along the river bank to protect the railroad tracks of that vicinity. Thomas Nugent, of the Nugent Sand Company, recently returned from a trip to Chicago, Ill.

The E. T. Slider Company, since the return of Superintendent P. C. Donaldson from his vacation, is doing fine business. The electric diggers and hoists of the Slider company are working full time these days and orders are being booked for a constantly-expanding range of work.

T. B. Rippey, manager of the Kentucky River Stone & Sand Company, of Lawrenceburg, Ky., is planning extensive improvements in his properties. A set of tow barges, a sand pump outfit, a gasoline tow-boat and machinery for unloading sand and gravel from the boat to the hopper on the shore are to be purchased at once by the Lawrenceburg company in improving its equipment.

#### PITTSBURGH SAND AND GRAVEL NOTES.

The outlook for a big year in the sand business is exceptionally good. Much more work is going forward than at this time last year and the evidences that are given by the sand companies here all prove that contracts already awarded are very satisfactory with the exception of prices. The large amount of city work is going to keep up a steady demand for building sand as well as for the street improvements themselves. All the companies are busy and several of them are increasing their facilities. The weather has been extremely bad most of the spring and this, together with the floods, kept the diggers from work until very recently.

J. K. Davidson & Brother, whose yards are at 42nd street, report excellent business in April. They are working three boats, two dredges and one tow boat. Street work has hardly started yet, they say, owing to the fact that weather and roads have been too bad for operations to proceed on a profitable basis.

The Iron City Sand Company is building a new boat which will add considerably to its facilities on the Allegheny river. All its diggers are working at present. It is very busy with different contracts on the North Side and also on the improvements over on the South Side streets, and reports business in general much better than last year.

The James Jiles Company, at Liberty avenue and 38th street, says there is a marked improvement over last year. Prices, however, have advanced very little. April business was good with this firm and present prospects are very satisfactory for outside shipments are also good. Their output is foundry sand and they are quick to feel the new impetus in the steel business in this section.

The National Sand & Gravel Company reports plenty of contracts, prospects good and everything O. K. except prices, which do not stiffen at all. Competition is very keen and, in spite of the fact that sand is hard to get, bids are down to the minimum of profit in the handling.

The Rodgers Sand Company has ordered twelve new steel barges to be built by the American Bridge Company. It has already received one of these and will get two barges a month until the order is completed. The company has rebuilt its boat, the Charlotte, and is now working its boats and diggers on the Ohio and Allegheny rivers. Business is much better than last year, so that its operations are going forward now at double turn.

The Diamond Sand Company has bought a property at New Castle Junction, Pa., for sand pits and also started operations. Washing equipment will be installed. The main promoter is Horatio G. Dohrman of Steubenville, Ohio.

The Tri-State Sand & Gravel Company has been organized by George H. Jones, T. L. Wagoner and David M. Carter of Rochester, Pa. It will start operations in the near future.

J. M. Stockham and others of Portsmouth, Ohio, have about completed arrangements for a new sand plant near that place. The sand will be secured from the Scioto river and will have to be hauled only a short distance.

The Juniata Sand Company, which operates near Lewistown, Pa., is having two 30-ton sand barges built. Two more boats have already been launched and are now in operation.

The Pennsylvania Glass Sand Company, operating near McVeytown, Pa., got a bad scare last week when 700 pounds of dynamite was exploded in its Dull mines. The charge failed to accomplish blowing out the roof of the second story and thus securing a solid foundation for a new load.

The Mountain Park Land Company of Connellsville, Pa., is making extensive tests of the sand found in the Cheat river with a view to using it in constructing a large dam near the state line. Additional tests are also being made on the rock near the dam site. Actual conditions of the dam will be started as soon as May 15.

Owing to the death of Calvin E. Brodhead, a large stockholder in the Greenville Silica Sand & Quarry Company of Greenville, Pa., that concern will be reorganized. Mr. William Yeo, a pioneer in the silica sand business, who is at present in charge of the plant at Dunbar, Pa., and is also the inventor of a sand dryer, will have charge of the quarry and manufacturing end. The officers recently elected are: J. Allison Keek, president; E. S. Templeton, vice president; R. H. Brodhead, secretary and sales manager; J. J. Hutcheson, Jr., treasurer; William Yeo, manager. New equipment will be installed at once to double the capacity of the plant.

The Pittsburgh White Sand Company has completed a large circular reservoir for conserving its water supply near Middleton, Pa. From the reservoir the water will flow by gravity into the works.

A thousand pounds of dynamite was exploded at one blast last week by the Trumbull Stone & Sand Company at its quarry at Brodville, Ohio, bringing down 5,000 tons of rock. Electric connection made the discharge in the five holes simultaneous. The stone is crushed and makes a fine quality of sand which is shipped to eastern states.

#### THE NEW YORK MARKET.

New York, May 13.—Trading in the local sand and gravel market was of moderate proportions during the past month, due to the fact that the rainy weather has retarded work on outdoor jobs, and has also delayed operations on new specifications. Local dealers, however, report that the inquiries received are normal for this time of the year and deliveries will be made as soon as the weather moderates. Prices are well maintained, and dealers look for a good improvement in the demand within the next couple of weeks.

Charles A. Fox, general manager of the Phoenix Sand and Gravel Company, speaking of the local sand and gravel situation, said: "The demand for sand and gravel during the past month was fairly active. The ten days of inclement weather has brought outdoor work to a standstill and consequently business has slackened up. However, with favorable weather conditions we look for a steady demand, as we have received a number of inquiries within the past two weeks. A large number of jobs are under way and as soon as the contracts are awarded there ought to be a good demand for our products."

Joseph N. Ely, of the Crescent Sand & Gravel Company, had the following to say concerning the sand and gravel situation: "Business has been quiet during the past month and the spring demand to date has been very backward. The rainy weather that we have experienced of late has retarded work in all building branches considerably. Prices, however, have remained steady and we are now quoting 85 cents for gravel per cubic yard and 45 cents for sand alongside dock. We expect as soon as the weather moderates that we will commence to fill our orders and do a good amount of business."

At the offices of the Goodwin Sand & Gravel Company it was reported that the spring demand for sand and gravel has been late on account of the inclement weather experienced during the past month. The demand has suffered on this account, but they look for a vast improvement in business conditions as soon as the weather permits. Prices have been well maintained and sand is now quoted at 45 cents per cubic yard, and gravel is bringing from 80 to 85 cents per cubic yard alongside.

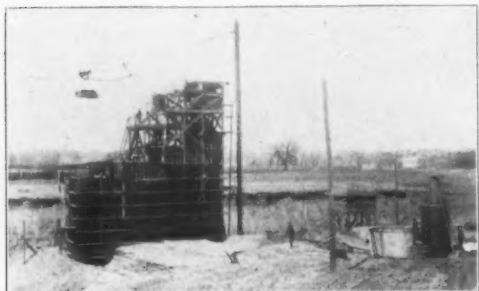
Mr. Gallagher, of the Gallagher Brothers Sand and Gravel Company, stated: "The amount of business that came to hand during the past month was much larger than the previous month, but notwithstanding this increase the spring demand for sand and gravel has only been fair. The spring season has been backward and the past ten days of rainy weather has made conditions quiet. Prices are steady. The outlook for good business is bright and we have received quite a number of inquiries of late."

# AN UP-TO-DATE WASHING PLANT



J. W. McGRATH, MANAGER.

Description of a model washing plant is always helpful to the trade and the one given here was secured in rather a unique way. T. E. McGrath, secretary and sales manager of the Mackinaw Sand and Gravel Company of Lincoln, Ill., was induced to write this description of his plant, but, while willing to show pictures of his equipment, he steadfastly refused to give out pictures of himself and brother. Another member of the family, whose



TRAMWAY IN OPERATION.

name is suppressed to protect him, gave them up, however, and our good friends, the McGrath Brothers, doubtless will be surprised. But to the story:

"Lincoln, Ill., May 8—Gentlemen: Complying with your recent request for photographs and a description of our new gravel washing plant, we are pleased to advise you that photographs are being mailed you under separate cover and our description is submitted herewith.

"In contemplating the building of our new plant, we thought it advisable to visit other plants and get as many good ideas as possible to incorporate in our plant. We accordingly visited practically all the prominent plants in Illinois, Wisconsin and Indiana.

"The universal indorsement and recommendation of Raymond W. Dull & Co., as well as our previous dealings with them, led us to place the equipping and construction of our plant in their hands, without competition. We would unreservedly do the same thing again, as we are convinced that our plant, for its size, is the best designed and equipped plant in the country. This statement may sound extravagant, but we have been in the gravel producing business several years and have tried practically all the various methods for producing material, and never before have we gotten results to compare with what we are getting with our new plant. Results are what count with us and that is why we claim what we do.

"Our plant has a capacity of twenty cars per day of ten hours, with a working force of four men

and two boys. We are crushing the boulders, sizing and washing the gravel and making two sizes of sand or five sizes altogether, and it is all excellent material.

"Mr. Dull recommended the Shearer & Mayer one and one-half yard cable-way excavator for digging and delivering the material to the plant, and we believe that this machine cannot be equaled for this work. Two men operate the machine, which means low cost of handling, considering that there are no intermediate handling devices, such as switch engines, dump cars, conveyors or the like, as the bucket which does the excavating also delivers the material into the hopper at the top of the plant.

"The machine will deliver a full yard and a half averaging a round trip in a minute and a half. We wish to recommend this machine, as we are well pleased with it. The cable-way is operated by a 9 by 10-inch double cylinder, double friction drum Lidgetwood hoisting engine with independent boiler. This engine is giving excellent service and we have not had a minute's delay with it.

"Through the hopper at the top of the plant the material is fed by a rotary feeder into a bar grizzly. The oversize goes into a 9 by 16-inch jaw crusher and the fines go into the washing screens. These screens are the Dull company's patented improved conical gravel washing screens, which have the large hook-bolt method for securing the perforated metal to the casting.

"The success of our plant is largely due to these screens and steel automatic sand separators, and we can hardly conceive how these appliances could be very much improved.

"The screen bearings and drives are away from the grit and water and the perforated cone is so easily changed that it leaves very little more to be wanted in a screen. The steel sand separators are triangular tanks, balanced on knife edges and arranged with counter-balancing levers, which automatically weigh the accumulation of material in the tanks and discharge the clean sand as fast as it accumulates. The water with impurities passes out through spill-ways at the top of the tanks. The material goes into compartment bins which hold about twenty cars of material.

"Our deposit is about 60 feet deep and improves with the depth. It runs about 50 per cent sand and 50 per cent gravel. We are located on the Illinois Traction System, centrally between Peoria, Bloomington and Lincoln, and ship exclusively over that line. We run our plant by electric motor, getting the current from the Traction System.

"We expect this year to be the biggest year yet for business. We have already booked over six hundred cars, and the prices are also good. Our prices average 60 cents at the pit.

"The officers of our company are: Walter Porter, president; James W. McGrath, manager; T. E. Mc-



T. E. McGRATH, SECRETARY AND SALES MANAGER.

Grath, secretary and sales manager; Wm. H. Evans, treasurer.

"We invite all who are interested in our plant to come and visit it, as we will be glad to show it to anyone.

Very truly yours,

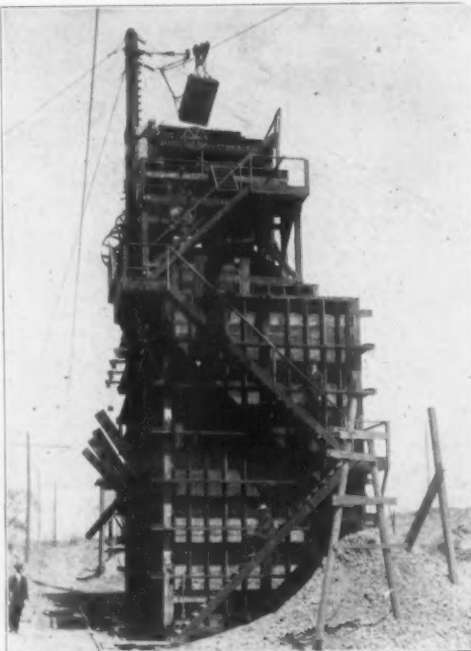
"Mackinaw Sand & Gravel Co.

"T. E. McGrath,  
"Sec. and Sales Mgr."

The gravel plants in Niles canyon, across the bay from San Francisco, which furnish a good deal of the better grade of gravel for the local and Oakland markets, are having trouble this spring on account of the dry winter. These concerns depend on the winter freshets to bring down the gravel, but the freshet failed to come last season, and they are accordingly compelled to move their equipment about 1,000 feet down the creek. In this connection the California Building Material Company recently placed a rush order for quite a lot of new equipment. The Niles Sand, Gravel & Rock Company is opening up a new bed in the same locality, and expects to start up its equipment in about a month.

The Keystone Sand & Gravel Company has been incorporated at Coupeville, Wash., with a capital stock of \$100,000, by I. T. Todd, A. J. Morrill and others.

The Missoula Crushed Rock & Gravel Co., of Missoula, Mont., has been incorporated, with a capital stock of \$15,000. Elmer B. Hershey, J. P. Woodbury and J. M. Keith, all of Missoula, are the incorporators.



REAR VIEW, SHOWING BUCKET.



GENERAL VIEW OF THE PLANT.



### PITTSBURGH RETAILERS.

Pittsburgh, Pa., May 10.—Retailers all through the city are feeling much the best they have for four years. Nothing but a season three weeks late has prevented them from doing a big business this spring. Prospects now are all to the good for a strong and steady summer buying. While street and road work is just starting owing to the backward weather there is a large amount of it to be done and prospects are that sales in this line, especially in the city, will be away ahead of those of last year. The chief interest to the builders' supply dealers is the removal of the hump, a \$2,000,000 project which is already started. Several streets are now torn up to a depth of six or eight feet and blasting will be started soon to bring the level down to a grade some sixteen feet below the present Grant street level. Aside from the main contract there is going to be an enormous amount of work in relocating the sewers, telegraph, and telephone lines, etc., and a scarcity of men is already imminent. Work of raising the streets on the North Side to flood level is proceeding steadily and in itself is the biggest job of its kind by far that the city ever tackled. A number of big grade crossing improvements are scheduled for this summer, chief of which is the Second avenue crossing of the Pan Handle, where an undergrade crossing will be put in and the improvement of the Pennsylvania railroad tracks in Wilkinsburg, an East End suburb, to cost at least \$1,000,000. In reports from the country dealers it is evident that a large amount of grading and paving will be done by nearly all the boroughs in this part of the state. Waterworks construction is also prominent in the calculations. Building so far has shown up better in these country towns than in the city, although there is a good prospect that city building is going to be carried on with much vigor and two or three weeks of good, warm, spring weather would put a snap into contractors buying, so retailers say.

W. H. Williams Company, which has been located for years on Fifth street, is now at 100 Penn avenue in a very good location, equally as central to the buying interests of the city. Its trade is well established and in its new location it is busy.

Councils of Braddock, Pa., an East End suburb, have passed for final reading a grade crossing ordinance for the P. R. R. This will eliminate the Copeland street tunnel and also the tunnel on Verona street. The improvement will be made at once and will cost \$150,000.

The Nicola Brothers Company has recently secured some very nice contracts, among them a big trestle near Monessen, Pa. Its big jobs in West Virginia for the Consolidation Coal Company and other large corporations there will keep it employed in that state for many months to come.

James M. Porter is now established in a very nice suite of offices on the eighteenth floor of the Oliver building. His business in paving brick looks first class. The prospects are that this year will be ahead of the past three or four years in the total of sales, and no wholesaler in this district is better equipped to fill big orders on short notice than this veteran.

State Highway Commissioner E. M. Bigelow, who is also consulting engineer for the Allegheny County Commissioners on bridges and tunnels, is now modifying his original plans for a tunnel to the South Hills district. His new scheme is likely to be accepted by the County Commissioners shortly and it is thought that work on the tunnel will be started this fall at the latest.

The big tunnel through Mt. Washington, constructed some eight years ago by Pittsburgh Railway Company interests, has shown signs of caving in this spring. This was caused by the side walls settling or letting the apex of the tunnel part. Recently the masonry was strengthened and in addition to this a heavy frame work has been erected between the tracks to support the upper center of the tunnel. It is thought that an iron ceiling will be put on the tunnel some time this summer.

Russell Box & Lumber Company is considering plans for a \$75,000 plant on Munson avenue, McKees Rocks. The company is now located on Wilson avenue in that borough.

Knox, Strauss & Bragdon say things are pretty lively. They had a very good month in April, much better than last year. Prices are fair, prospects are good, and with better weather they look for an active season. Street work, they say, is unusually late in starting, which will make buying all the more eager when it fairly starts. They report the best demand at present for cement.

The Houston Brothers Company is well filled up with orders. About the only kick that it has to make against the situation at present is that a clay miners' strike is on at Uhrichsville, Ohio, which has hindered somewhat its sewer pipe deliveries. Few shipments are being made in pretty good form in spite of it. The company's business in brick is fine and its shipments are away ahead of last year in this line. Its officials say that there is lots of building opening up now and that business is here. All we need is decent weather to develop it, they believe.

House building operations of the cheaper sort are beginning to loom up in a way that looks something like old time building. At Elwyn, on the Castle Shannon road, contracts were let by Newport Brothers the other day for seventeen houses, on which work has started. In the Squirrel Hill district, Pittsburgh, several jobs of ten or a dozen houses have been let lately, and at Sewickley fifteen houses are under way for one operator. In general house building this season will be confined to the moderate priced residences, however, built by individuals.

The raising of the streets in the flood district of the North Side is the largest improvement of its kind that has ever been undertaken in Pennsylvania. Outside of the mere street improvements more than fifty of the largest buildings on the North Side, nearly all store buildings, have been raised from six to eight feet. The John Eichleay, Jr., Company handled nearly all this heavy raising, and one of the buildings weighed over 6,000 tons. The same company is raising a number of large buildings on Main and Steuben streets in the West End, where similar filling in of streets is going forward rapidly.

Booth & Flinn, Ltd., have several hundred men at work on the hump cut and the barrier which has stood between downtown and good business for forty years against the protest of a large proportion of Pittsburgh's good citizens is being removed rapidly. Fifth avenue is torn up from Smithfield to Grant street and Grant street is already cut down eight feet, as is also Virgin alley. The grade will be reduced at Grant street about fifteen or eighteen feet. Director of Public Works Armstrong has notified all owners to start remodeling their buildings as soon as possible and public works companies are hustling to get their wires, conduits, etc., out of the way of the contractors.

The following contractors were lucky in getting away with some very nice work awarded by Public Work Director Joseph G. Armstrong on May 4: Repaving with blockstone, Penn avenue, to H. C. Howard, \$27,821.31; Selby avenue, to Thomas Cronin Company, \$1,600; South Twenty-fifth street, to Thomas Cronin Company, \$6,848.48; West Carson street, to Booth & Flinn, \$2,195.05; Watkins avenue, to Thomas Cronin Company, \$8,747.43; Liberty avenue, to H. C. Howard, \$8,582.01.

Repaving with wood block, Sandusky street, to M. O'Herron Company, \$2,156.50; Ohio street, to H. C. Howard, \$16,273.86; repaving with brick, Pretense alley, to J. B. Sheets, \$1,340.96; repaving with asphalt, Penn avenue, to Booth & Flinn, \$8,837.05; Fifth avenue, to Booth & Flinn, \$21,646.29; Perrysville avenue, to Booth & Flinn, \$18,462.80.

Grading, paving and curbing with brick, Loretta street, to M. O'Herron Company, at \$9,749.01. Grading, paving and curbing with blockstone, Merriman alley, to Thomas Cronin Company, at \$1,967.04.

Construction of sewers, Stebbins street, to Nick Diulus, at \$413.20; Butler street, to M. O'Herron Company, at \$5,431.30. Construction of retaining walls, Metcalf street, to F. F. Schellenberg Co., at \$6,043; Paulowna street, to Evan Jones & Co., at \$3,981.50; Elliott street, to Ott Bros. Co., at \$3,418.40; altering steel columns and bracing West Side Belt Railroad, to F. F. Schellenberg Company, at \$640.

This is only the first batch of spring contracts, for many more of similar importance are to be awarded within the next few months.

Pittsburgh Councils propose to separate the grades at the Thirty-third street crossing of the B. & O., where 15,000 people cross the railroad daily. The B. & O. has signified its intention to accept the city's estimate of \$645,000 for the cost of the work, which would include the elevation of the Junction railroad tracks over Liberty avenue.

### SAN FRANCISCO RETAILERS.

San Francisco, May 3.—The West Coast building material business continues to improve, and there is no longer any doubt that the coming summer will be the busiest in several years. The local building record for last month is hardly as good as for March, but shows a fair gain over a year ago, and actual sales of material are larger than at any time since the first of the year. The April building permit at Oakland and Sacramento, Cal., were practically the same as for March, while both Los Angeles and San Diego, Cal., Portland, Ore., and Seattle, Wash., showed very heavy gains. In fact, the North Coast cities, which were quiet for a time, are now more than holding their own. Aside from this there is a lively country trade, as the assurance of good crops enables the farmers to go ahead with much contemplated irrigation work. Contracts have been let, moreover, on several large development projects, including a new concrete wharf in this city.

Prices on building materials have not changed appreciably, but there is a little stronger feeling all around. The retailers expect considerable benefit from a publicity campaign for which the cement manufacturers are preparing.

The Big Basin Lumber Company, a building material firm of Klamath Falls, Ore., has taken a contract to furnish 50,000 barrels of cement for the California-Oregon Light & Power Company, which is building a large dam in the Klamath river.

The town of Glendale, Cal., will take bids May 6 for 1,450 sacks of cement.

Twenty-nine blocks in Pontiac, Ill., probably will be paved soon.

The National Silica Company, Detroit, Mich., has increased its capital stock from \$75,000 to \$200,000.

O. T. Dunlap of Edwardsville, Ill., landed the No. 3 district paving contract at Edwardsville for \$35,018.

Seven blocks in Aurora, Ill., will be paved by the McCarthy Improvement Company of Davenport, Iowa, for \$39,457.

The Capitol City Concrete Construction Company of Springfield, Ill., was awarded a \$62,500 asphalt paving contract at Rossville, Ill.

The Gund-Graham Company of Freeport, Ill., has been awarded two paving contracts in that city, one worth \$10,000 and the other \$24,262.

The Paving Contractors' Association, of Chicago, Ill., has been incorporated by John Ogara, C. C. Lakin and Irving D. Potter. The object of the organization is to promote and advance the interests of the trade.

The South Shore Supply Company of Chicago has been incorporated with capital stock of \$2,500 to quarry stone and deal in building materials. The incorporators are Charles J. Luck, William E. Rafferty and Edward Graff.

One of the biggest paving contracts let in Southern Illinois for some time was at Venice, Ill., when A. W. Eisenmayer was given the Broadway, Madison avenue and State street job for \$106,966. This is to be of creosote blocks on concrete foundation.

The Supple & Roseman Company of Danville, Ill., has been incorporated with capital stock of \$15,000, to manufacture and deal in building materials. H. H. Roseman, one of the incorporators, was formerly connected with the head offices of the Illinois Traction System at Springfield, Ill. The other incorporators are James G. Supple and G. M. Volman.

The Edgemoor Sand and Gravel Company, West Pittsburg, Pa., which is located on the B. & O. railroad near New Castle, twenty-two miles east of Youngstown, Ohio, have forty-five acres of sand and gravel with a depth of twenty-five to 100 feet of fine quality material. It is going to install two elevators to take care of a capacity of 12,000 tons every ten hours.

# MORE OR LESS PERSONAL

Roger Titus, sales manager of the Best Brothers Keene's Cement Company, Medicine Lodge, Kas., died a few weeks ago. He was formerly with the American Gypsum Company of Port Clinton, Ohio.

James P. Donovan, a well-known concrete worker of Georgetown, Ky., has disposed of his concrete block plant to other interests and will specialize in the manufacture of concrete silos for the farmers of Georgetown and vicinity hereafter.

William H. Ford, of the Canada Cement Company, Montreal, Quebec, Canada, with a number of his confreres visited the cement manufacturers' meeting the other day and incidentally dropped in to renew acquaintance with the Rock Products' family.

Of the out-of-town visitors this month we discovered James Leenhouts, of the Grand Rapids Plaster Co., Grand Rapids, Mich., Jacob Urschel, of the Woodville White Lime Co., Toledo, O., and J. M. Sheridan, of the Sheridan Stucco Retarder Co., Toledo, O.

Articles of incorporation have been filed by the Benton Stone & Crusher Company, and work has begun upon the installation of a mammoth rock crushing plant near Springfield, Mo. The incorporators of the company are Sidney Beacon, George Schurer, James Boyd and John Brandon. The capital stock is \$10,000.

Col. Dan Ritter, assistant to the president of the Lehigh Portland Cement Co., of Allentown, Pa., was in town the other day en route to the plants of this company in Washington, Indiana and Iowa. Mr. Ritter is very much interested in the latest machinery applied to the manufacture and handling of cement, and is looking over the splendidly equipped plants of their institution.

Weston & Brooker, of Columbia, S. C., have purchased the Ross quarry from Capt. R. G. Ross, of Jacksonville, Fla. The quarry is situated just across the Congaree river at Cayce, and application has been made to the secretary of state for a commission. The Weston & Brooker Quarry Company will be organized at once. The quarry produces a fine quality of crushed stone and has an output of 1,600 tons a day. About 125 men are employed.

Horace G. Kimble, of the Kent Mill Company, New York City, was in Chicago en route to the great southland. Mr. Kimble said the demand for pulverizers really was on the increase and while some branches of the business were quiet at this time they are well pleased with the volume of orders coming in.

Mr. Kimble has been in ill health for several months but looks like the real old H. G. once more, and is being congratulated wherever he goes.

John B. Crafton, formerly of Bloomington, Ind., and well known in the stone quarry industry, was one of those who went down in the ill-fated Titanic. Mr. Crafton had been in Europe a short time, and took passage on the giant steamer to return home. He was the founder of the Crafton Stone Company, which operated quarries south of Bloomington, and was identified with the stone industry at Bloomington for a number of years. It was through Mr. Crafton's efforts that the Monon Railroad Company constructed what is known as the "stone railroad" from Clear Creek to Harrodsburg, which serves all the big quarries in that district.

W. B. Huskey, who has long been known to the crushing interests of the lake district, is an expert in the crushing and grinding machinery line, has now taken up his headquarters in the sales office of the Power & Mining Machinery Company of Atlanta, Ga., 406 Equitable Bldg., where he occasionally may be found. Nearly always he is around amongst the crushing and grinding of stone and rock products of all descriptions, and he has got the dope of almost every proposition of this kind that can be presented to his attention, and when he has not got the dope on tap he knows how to get it in less time than it takes to imbibe a real southern mint julep in the summer time. It was only a short time ago that a photographer on our staff secured a picture of the handsome and familiar features of Mr. Huskey and it is presented on this page so that the men who have crushing propositions and grinding problems on hand will

know that the real thing has arrived when they recognize his countenance.

Frank E. Holmquist has been elected secretary and treasurer of the Rockford Concrete Construction Company of Rockford, Ill., to succeed Will H. Gaffney and will have active charge of the business, George D. Roper and associates having disposed of their interests. The company will do no contracting, but will make building stone and hollow waterproof blocks.



THIS IS A DESCRIPTION OF THE WAY WM. H. FORD, OF THE CANADA CEMENT COMPANY, SPENT THE WINTER AT SUMMERVILLE, S. C., AND IS FOR THE EDIFICATION OF HIS CANADIAN CUSTOMERS.

## INTERESTING DECISION.

A decision of interest to concrete contractors and supply men has been handed down by the Appellate Court at Mt. Vernon, Ill.

When the Cairo division of the Big Four railroad was constructed in 1905, the contract for the concrete work, bridges, culverts, etc., was let to the Widell-Finley Company. Mt. Carmel, Ill., was a convenient source of supplies and much of the material was bought from dealers in that city. The Widell-Finley Company found its contract a losing one and was forced into involuntary bankruptcy. The dealers, feeling that the road had received full value for their material which had gone into construction work, pooled issues and brought a test suit. In the circuit court they were given judgment. The railroad appealed and the recent decision not only reverses and remands the judgment of the circuit court but orders the bill dismissed because the railroad company had already paid the Widell-Finley more money than was due it and "the sub-contractor can in no event force a lien against the property of the railroad company except where the company is indebted to the original contractor by the terms of its contract with him."

It is reported that the Peoria & Eastern Railway Company will construct a 15,000,000 gallon reservoir at Hillery, Ill., of which a reinforced concrete dam 500 feet long and 30 feet high at the center will be a part.

The Trunk-Hinekey Company of Freeport, Ill., has been awarded a contract to erect a reinforced concrete bridge near Hanover, Ill., under the supervision of the Illinois State Highway Commission.

A 24-stall concrete roundhouse at Circleville, near Pekin, is included in the reported plans of the Peoria, St. Louis & Northwestern railroad, which is a branch of the Northwestern system from Peoria to Girard, Ill.

The Sadorus Lumber Company of Sadorus, Ill.,

has added a concrete block manufacturing department for which a new building has been erected.

Many thousands of feet of concrete walk will be voluntarily built this summer in Hillsboro, Ill.; therefore, the city commission will pass an ordinance creating a standard for all work of this class.

## History Makers of the Building Material Industry

One of the elements of success that counts for a good deal in business, is to have a knowledge of conditions concerning the business covering the entire country. Such is the distinct characteristic of Sheldon H. Bassett, president of the Knickerbocker Portland Cement Company. Since ROCK PRODUCTS commenced making its readers familiar with well known men in the building material industry, it has had the pleasure of presenting a number of men, noted for one thing or another, and it has been always evident that some one characteristic stood out above every other quality in the character of each of them. In the case of Mr. Bassett, his character may be said to be of the all around sort, for he is a much traveled man, a man of education, a man of technical knowledge, a man of broad ideas, a man of the strictest integrity, and a man who believes in his own country and believes in his own company, too, and the product which he sells. Mr. Bassett was born in Derby, Conn., April 11, 1867, so that he is just about commencing the real business years of his career, for he has behind him the experience and the training of the past that equips him now for the brilliant future in store for cement. He attended school in Derby until he was 15 years old, when he left the High School and went to Germany to continue his education, remaining there for several years, and gaining a wide knowledge of German customs and methods. Upon his return to America, he went into his father's machine shop and took off his coat. He learned the machinist trade from the bottom up and followed the machinery business until 1900, when the presidency of the Iola Portland Cement Company was offered him and he accepted it. The company had a plant at Iola, Kan., and was then in its infancy. He made his home in St. Louis, Mo., a town situated on the Mississippi River, 300 miles or so from Chicago, and he continued to act as president and general manager of the Iola Portland Cement Co., which became the largest and most successful in the West and was sold in 1906 to a syndicate. In 1908 he resigned in order to return to the East and assume the presidency of the Knickerbocker Portland Cement Company, which he was instrumental in organizing. As Mr. Bassett manufactured cement in the West for so many years, supplying the trade from the Mississippi River to the Pacific Coast and south to the Gulf of Mexico, he gained an experience for the more important undertaking in the East that has been of great value to him. The Knickerbocker plant is located at Hudson, N. Y., on the Hudson River, strategically situated so that its product finds a ready consumption, not only in the great city of New York, but generally throughout that region. Mr. Bassett has a very fine acquaintance and an intimate knowledge of portland cement conditions throughout the United States. His long experience has made him thoroughly familiar, not only with the operating, but the selling and executive departments of the Portland cement business. Personally, he is an estimable gentleman and everybody connected with the Knickerbocker Company is not only his loyal employee, but his loyal friend. This is the kind of organization that counts for success in any business and is invincible.

## ROCKS FOR ROAD BUILDING.

A very interesting bulletin will be published in a few weeks by the Good Roads Division of the Department of Agriculture on the "Physical Testing of Rocks for Road Building." The bulletin, No. 44, was compiled and written by H. T. Goldbeck, testing engineer of the division, and F. H. Jackson, Jr., assistant testing engineer. A table will be given containing the results of all the physical tests on road building rocks submitted to the division for testing from all parts of the country. This bulletin will describe the methods used in the office of the Good Roads Division for the testing and will interpret the results of the tests.

**C**LASSIFIED ADVERTISEMENTS placed in ROCK PRODUCTS are quick and sure result bringers. If you are in need of or wish to sell anything, or desire employes or employment—a Classified Advertisement in ROCK PRODUCTS will accomplish the desired result. This is amply attested to by the long list of satisfied users in ROCK PRODUCTS, Classified Columns.

The rates—twenty-five cents a line for first insertion, and decreasing proportionately for each successive insertion—are very low when the immense circulation is taken into consideration.

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- Building Construction and Superintendence—Masonry Work**  
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- Hydraulic Engineering**  
F. E. Turneaure and Adolph Black. Price \$3.00.
- Analysis of Elastic Arches of Steel, Masonry and Reinforced Concrete**  
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- Theory of Steel-Concrete Arches and Vaulted Structures**  
Wm. Cain. Price \$0.50.
- Concrete Country Residences**  
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- Graphical Handbook for Reinforced Concrete Design**  
John Hawkesworth, C. E. Price \$2.50.
- Architects' and Engineers' Handbook of Reinforced Concrete Construction**  
L. J. Mensch. Price \$2.00.
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Arvid Reuterdaahl. Price \$2.00.
- Treatise on Concrete, Plain and Reinforced**  
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- Concrete Engineers' and Contractors' Pocketbook**  
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W. N. Twelveteens. Price \$1.90.
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- Portland Cement: Its manufacture, testing and use**  
David B. Butler. Price \$5.00.
- Instructions to Inspectors on Reinforced Concrete Construction**  
Geo. P. Carver. Price \$0.50.
- Lime, Mortar and Cement**  
A. I. Dibbin. Price \$2.00.
- Cements, Limes and Plasters**  
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- Practical Treatise on Limes, Hydraulic Cements and Mortars**  
Gen. Q. A. Gillmore. Price \$4.00.
- Mortars, Plasters, Stuccos, Concretes, Portland Cements and Compositions**  
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H. LeChatelier. Price \$2.00.
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Richard K. Meade. Price \$3.50.
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- Calcareous Cements**  
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- Gas Engines and Producers**  
L. S. Marks and S. S. Wyer. Price \$1.00.
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### Cement Users

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Myron C. Falk. Price \$2.50.
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F. B. Gilbreth. Price \$5.00.
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- Handbook on Reinforced Concrete**  
F. D. Warren. Price \$2.50.
- Sewers and Drains**  
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Edward Godfrey. Price \$2.50.
- Popular Handbook for Cement and Concrete Users**  
Myron H. Lewis & A. H. Chandler. Price \$2.50.

**ROCK PRODUCTS, 537 South Dearborn Street, CHICAGO**

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**For Mortar, Cement and Brick  
Brown, Black, Red and Buff  
Strongest and Most Durable**

Manufactured by **C. K. Williams & Co.**  
Correspondence Solicited **Easton, Pa., U. S. A.**

### "The Public Be Pleased"



**CALVERT MORTAR COLORS**

Sold to Dealers Only

**JAS. B. MACNEAL & CO., Makers  
BALTIMORE, MARYLAND**

Write for Our COLOR Barometer



**"K & J" CARS**  
FOR QUARRIES

An extremely heavy ship. Length, 10 feet; width, 4 feet; depth, 4 feet 2 inches; all inside dimensions. Capacity 165 cubic feet.

We Build Every Type of Car that Quarry Work Demands.

Get Booklet "Some Car Suggestions."

"K & J" Cars are built for "Continuous Service."

**The Kilbourne & Jacobs Mfg. Co.**  
Plant and General Offices, **COLUMBUS, O.** **NEW YORK**  
26 Broad St.

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Advertisements will be inserted in this section at the following rates:

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Eight words of ordinary length make one line. Headings counts as two lines. No display except the headings can be admitted.

Remittances should accompany the order. No extra charges for copy of paper containing the advertisement.

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#### WANTED.

If you are in need of or wish to sell anything which comes under any of these classifications, write us. If you have something not coming under these classifications we will create one for you.

#### WANTED.

Assistant chemist cement plant, \$65.00; general mill foreman, \$100-\$150; master mechanic cement plant, \$125; superintendent cement plant in foreign country, \$4,000. We need applications for the above position at once and have such openings on our list continually. If you desire a better position, write for application blank. THE ENGINEERING AGENCY, INC., Menadnock Bldg., Chicago.

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#### POSITION AS FOREMAN.

Position wanted as superintendent or foreman of lime works, by a hustler of fifteen years' experience, capable of taking full charge of plant, including quarry, and can be depended on at all times to keep things up to the minute, and in working order. Can furnish best of references from former employers and produce results. I am thoroughly familiar with Gas Producer and direct fire kilns. Also Hydrate Mill and Stone Crusher. Address "RESULTS," care ROCK PRODUCTS.

#### SUPERINTENDENT.

Position as superintendent of gravel or sand plant; 10 years' experience with large company; best of references; experienced with crushing and dredging machinery. F., care of ROCK PRODUCTS.

#### SUPERINTENDENT.

Position wanted as superintendent in stone quarry; 30 years' experience; best of references. Address BOX 96, Waterville, Ohio.

## FOR SALE

Complete Brick Plant, all in good order ready to operate, capacity forty thousand daily, located in Morris County, N. J., fifteen miles from Newark and the Oranges. : : : : Railroad at plant, low freight rates with Erie or Lackawanna. Well developed Clay and Sand Pits of best quality. Property contains over fifty acres; this property cost \$75,000; can be had for \$25,000, on liberal terms. For further information inquire. : : : :

**FRANK E. MORSE**

Telephone 4522 Broad  
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#### STONE CRUSHING PLANT.

For Sale—Stone crushing plant, located in the western part of Illinois, on C. & A. R. R. Two crushers and unlimited quantity of stone.

Address JOHN BROGEN, Eldred, Ill.

#### QUARRY.

For Sale—Modern machinery; grinds stone for glass manufactories, asphalt, etc.; also 17 acres of 98 per cent limestone, supply inexhaustible; four large lime kilns; stone crushers. Capacity, 1,500 bushels of lime and 80 tons of ground stone daily; business now contracted for full capacity. Unusual bargain. Write J. B. CRAWFORD, Godfrey, Ill.

#### PLASTER MILL AND GYPSUM LAND.

For Sale—Fully equipped plaster mill, together with 36 acres of Gypsum, comprising two veins, two shafts, with all machinery for operation. Capacity about 100 tons per day, twenty-four hours. Kettle process located at Garbutt, N. Y., on Pennsylvania R. R. and Buffalo, Rochester & Pittsburgh R. R. Good water power. Address C. L. TUTTLE, Trustee in Bankruptcy, 404 Exchange Place Bldg., Rochester, N. Y.

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An established building material business can be purchased, or present owners will retain twenty thousand dollars, located in one of the fast-growing southern cities. Address No. 413, care ROCK PRODUCTS.

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For Sale at a bargain, forty acres of high grade limestone, more than two hundred feet deep, very little stripping, high and dry. Ninety-six per cent carbonate of calcium. Adjoining city limits of Alpena, Mich., on railroad. Address Herman Besser, Alpena, Mich.

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For Sale—Stocks in Cement, Oil and Mining companies at bargain prices. GUILLOT & CO., Investments, Dallas, Texas.

### MATERIAL FOR SALE

#### THE BEAL CORE DRILL.

The best, cheapest and most effective core drill for testing quarries, coal and mineral lands. Brings a solid core, from 2 to 4 inches in diameter to the surface, showing the different formations it passes through. Records of each hole furnished. Correspondence solicited. Address, EDWIN S. BEAL, 214 Woodlawn Ave., Lansing, Mich.

### MACHINERY FOR SALE

#### LIME KILN.

For Sale—One No. 3 Keystone steel lime kiln complete with all buildings and equipment necessary for the manufacture of lime. One Gates stone crusher. Equipment practically new and will sell cheap. Address R. S. HANDFORD, Batesville, Ark.

#### FOR SALE—PULVERIZER.

For Sale—Pulverizer. Second-hand Williams No. 3, regular pulverizer. Capacity 40,000 brick in nine to ten hours. Machine in good condition. Will sell cheap. Address Kier Fire Brick Co., Oliver Bldg., Pittsburgh, Pa.

#### STONE CRUSHERS.

For Sale—Two No. 5, Style D, Gates Rock Crushers. Are in first class condition. The Iola Portland Cement Company, Iola, Kansas.

#### MACHINERY.

We offer the following machinery, second-hand and new, at a bargain:  
One 6'x24' Tube Mill.  
One 5'x22' Tube Mill.  
One 5'x16' Tube Mill.  
One 4'6'x8' Tube Mill.  
One Multiple Tube Mill for Mule Transportation.  
One Double Corrugated Crushing Roll. Four pairs small Corrugated Crushing Rolls. One Double Jar Mill. One large Disintegrator.  
The J. R. Alsing Engineering Co. 90 West St., New York.

For Sale—Cheap, 1 No. 5 style D Gates Crusher, complete with extra eccentric and concaves; Babbitt Mandrels; Lowering Rods, etc.; 45 ft. Gates Standard Elevator, complete; 40'x10' Gates Standard Revolving Screen, Engines, Boiler, etc., all in good condition. WEBSTER STONE CO., Irvington, Ky.

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We build municipal street work, turnpikes and give attention to all construction work of a similar character. Our organization is backed by twenty-five years experience, and we are in a position to furnish specifications and estimates promptly. Individuals, Corporations or Municipal authorities are invited to correspond with us.



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Consulting, Mechanical and Chemical Engineer, in Designing, Construction and Operation of Plaster Mills, (Kettle or Rotary Process), Elevating, Conveying and Crushing, Mechanical Drying, (Kiln or Rotary) and Hydrating Plants, Power Houses, Pumping Stations and Water Powers. Examination, Tests, Analysis and Reports, Plans, Specifications and Superintendence of Construction.

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### Stone Crushing and Power Plants.

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Special reports made on Quarries and Plants not producing results.

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You are invited to visit our booth at the New York Cement Show, Madison Sq. Garden, Jan. 29-Feb. 3.

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Personal, Expert Services. : : Fair and Reasonable Rates. : : 25 Years Before United States Patent Office. : : : :

C. T. BELT, Warder Bldg., Washington, D. C.





Stained with Cabot's Shingle Stains and lined with Cabot's Sheathing Quilt. Robert W. Spencer, Jr., Architect, Chicago

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**Cresote Stains** for Shingles, Siding, Clapboards, Trimmings, Boards, and all other Exterior Woodwork.

**Waterproof Cement and Brick Stains** for waterproofing and artistically coloring cement and brick buildings.

**"Quilt"** for lining houses to keep out cold or heat, for sound-deadening in floors and partitions, and for insulating cold storage and refrigerators.

**Conserve Wood Preservative** for preserving Posts, Planks, Sills and all other exposed timbers. Mortar Colors, Protective Paints for Metals, Waterproofing Compounds, etc.

**SAMUEL CABOT, Inc., Mfg. Chemists**  
BOSTON, MASS., U. S. A.

1133 Broadway,  
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### Changes of Copy

Must be in this office by the Thirteenth of the month, if proofs are desired; if no proofs are required the desired changes can be made if copy is received by noon of the Seventeenth.

### New Advertisements

To insure proper classification, should be in this office by the Fifteenth of the month, but they can be inserted in the last form going to press if received by the Nineteenth. The punctual publication of the paper admits no deviation from these rules. Advertisers are earnestly requested to co-operate with us.

**THE FRANCIS PUBLISHING COMPANY**  
537 South Dearborn Street, Chicago, Ill.

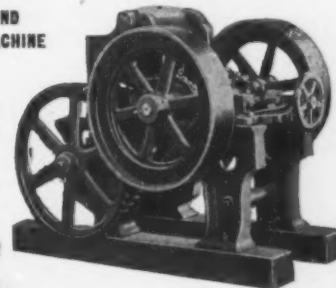
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IS A SAND  
MAKING MACHINE

Maximum  
Capacity  
25 tons  
Daily

Net Price

**\$90**



No. 2 Receiving Opening 12x5 inches.  
Weight 1,800 lbs. 3 Horse Power.

Guaranteed and sent on ten days' working trial, **send in your Order** and pay after you have tried it out.

Limestone, Lime, Fieldstone, Flint, Marble, Granite, Sandstone, Oyster shells, Rock, Etc., can be reduced at one operation to the fineness of sand, or to  $\frac{1}{4}$ ",  $\frac{1}{2}$ ",  $\frac{3}{4}$ ", 1" or  $1\frac{1}{2}$ " for roads, concrete materials and fertilizing purposes.

**H. MARTIN BRICK MACHINE MFG. CO.**  
Lancaster, Pa., U. S. A.

Crushers built in larger sizes also.

## Some Bargains in Quarry Equipment

One No. 10 McCulley Crusher.  
One No. 8 McCulley Crusher.  
One No. 8 Gates Style D Crusher.  
Two No. 7½ McCulley Crushers.  
Two No. 6 McCulley Crushers, manganese fitted.  
Two No. 6 Gates Crushers (one manganese fitted).  
Two No. 5 McCulley Crushers, manganese fitted.  
Two No. 5 Austin Crushers.  
Two No. 4 Austin Crushers.  
One No. 4 McCulley.  
Six No. 3 McCulley, Austin and Gates Crushers.  
Two No. 7½ Gates Crushers.

All of the above are complete with screens and elevators, but will be furnished with or without as desired.

4—No. 4 Champion Jaw Crushers and elevator—portable.

1—No. 10 Western Jaw Crusher and elevator—portable.  
1—10x18 Fort Wayne with elevator—portable.  
1—each 10x16 and 15x24 Buchanan—on skids.  
13—9x14, 36" gauge, Porter Dinkies.  
3—9x14, 36" gauge, Vulcan Dinkies.  
4—9x14, 36" gauge, Davenport Dinkies.

1—18-ton Porter.  
1—10x16, 36" gauge, Porter Dinkie.  
Several larger switches and locomotives.  
2—No. 0 Thew Shovels.  
3—Little Giant Traction Shovels.  
2—Model 20 Marions.  
2—45-ton Bucyrus.  
5—65-ton Bucyrus.

Several larger shovels of standard makes.

Write for Our Spring Bulletin of Bargains in Heavy Equipment Before You Buy. A Postal-Card Brings It.

**MARSH COMPANY,**

**971 Old Colony Building,**

**CHICAGO, ILLINOIS**

### ROCK PRODUCTS

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Urschel Bates Valve Bag Co.  
West Jersey Bag Co., The

## BAG TYERS.

Miller & Co., Clifford L.  
United Wire Tie Co.

## BAG PRINTERS.

Koehler Co., Hy. L.

## BELTING.

American Fabric Belting Co.  
Chicago Belting Co.  
Gandy Belting Co.  
Link-Belt Co.  
Stephens-Adamsen Mfg. Co.  
Webster Mfg. Company.

## BUCKETS, DUMPING AND GRAB.

Atlas Car & Mfg. Co.  
Burrell Mfg. Co.  
Kilbourne & Jacobs Mfg. Co.

## CEMENT BRICK MCHY.

Bartlett, C. O., & Snow Co.  
Martin-Henry Brick Machine Mfg. Co.

## CEMENT HYDRAULIC.

Carolina Portland Cement Co.  
Fowler & Pay.

## CEMENT MCHY.

Allis-Chalmers Co.  
American Pulverizer Co.  
Bonnot Co., The.  
Bradley Pulverizer Co.  
Cummer, F. D., & Son Co.  
Jeffrey Manufacturing Co.  
Kent Mill Co.  
Miscampbell, H.  
Raymond Bros. Impact Pulverizing Co.  
Ruggles-Coles Eng. Co.  
Smidth & Co., F. L.

## CEMENT, PORTLAND.

American Cement Co.  
Alpha Portland Cement Co.  
Atlas Portland Cement Co.  
Canada Cement Co.  
Carolina Portland Cement Co.  
Chicago Portland Cement Co.  
Copley Cement Mfg. Co.  
Dexter Portland Cement Co.  
French, Samuel H., & Co.  
Hartman, Wm. G., Cement Co.  
Kansas City Portland Cement Co.  
Knickerbocker Portland Cement Co.  
Ironport Portland Cement Co.  
Lehigh Portland Cement Co.  
Mecham & Wright Co.  
Northwestern States Portland Cement Co.  
Phoenix Portland Cement Co.  
Sandusky Portland Cement Co.  
St. Louis Portland Cement Works.  
Security Cement & Lime Co.  
Standard Portland Cement Co.  
Union Sand & Material Co.  
Universal Portland Cement Co.  
Whitehall Portland Cement Mfg. Co.  
Wolverine Portland Cement Co.

## CHAINS.

Taylor Iron & Steel Co.

## CLAY PRODUCTS.

Improved Equipment Co.  
Louisville Fire Brick Co.  
Union Mining Co.

## CLAYWORKING MCHY.

American Clay Working Mch. Co.  
Bartlett, C. O., & Snow Co.  
Cummer, F. D., & Son Co.

## CONCRETE AGGREGATES.

Bonnell Iris Aggregate.

## COMBUSTION ENGINEERS.

Improved Equipment Co.  
Northwestern Steel & Iron Works.

## CONCRETE BLOCK MCHY.

Anchor Concrete Stone Co.  
Century Cement Mch. Co.  
Chicago Structural Tile Co.  
Fisher Hydraulic Stone & Machinery Co.  
Francis Machinery Co.  
Northwestern Steel & Iron Works.  
Pettyjohn, The, Co.

## CONCRETE BRICK MACHINERY.

Peerless Brick Mach. Co.  
Northwestern Steel & Iron Works.

## CONCRETE MOLDS AND FORMS.

Northwestern Steel & Iron Works.  
Read & Morrill, Inc.  
Ubbink Steel Frame Co.

## CONCRETE MIXERS.

Chalmers & Williams.

Miscampbell, H.  
Northwestern Steel & Iron Works.  
Standard Scale & Supply Co.

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Chattanooga Paint Co.  
Clinton Metallic Paint Co.  
Macneal, James B., & Co.  
Rickerson Mineral Paint Works.  
Williams, C. K., & Co.

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American Steel & Wire Co.  
Buffalo Wire Works Co.

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American Fabric Belting Co.  
Austin Mfg. Co.  
Bartlett, C. O., & Snow Co.  
Caldwell, H. W., & Sons Co.  
Dull, Raymond W., & Co.  
Ersbam, J. B., & Sons Mfg. Co.  
Jeffrey Manufacturing Co.  
Link-Belt Co.  
McLanahan Stone Machine Co.  
Stephens-Adamsen Mfg. Co.  
Webster Mfg. Company.

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Allen Edgar American Manganese Steel Co.  
Allis-Chalmers Co.  
American Pulverizer Co.  
Austin Mfg. Co.  
Bacon, Earl C.  
Bartlett, C. O., & Snow Co.  
Bonnot Co., The.  
Bradley Pulverizer Co.  
Butterworth & Lowe.  
Chalmers & Williams.  
Chrome Steel Works.  
Ersbam, J. B., & Sons Mfg. Co.  
Jeffrey Manufacturing Co.  
Kent Mill Co.  
Lewistown Foundry & Machine Co.  
Marsh Co.  
Martin, Henry.  
McLanahan Stone Machine Co.  
Pennsylvania Crusher Co.  
Smith, T. L., & Co.  
Symons Brothers.  
Sturtevant Mill Co.  
Taylor Iron & Steel Co.  
Williams Pat. Crusher & Pulverizer Co.

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Nuttall, R. D., Co.

## DRILLS.

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Howells Mining Drill Co.

## DRYERS.

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Bartlett, C. O., & Snow Co.  
Cummer, F. D., & Son Co.  
Power & Mining Machinery Co.  
Ruggles-Coles Eng. Co.  
Worrell, S. E.

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Power Mining & Mch. Co.  
Sackett Screen & Chute Co., H. B.

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Austin Mfg. Co.  
Kilbourne & Jacobs Mfg. Co.  
Stephens-Adamsen Mfg. Co.

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Troy Wagon Works Co.

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DuPont Powder Co.

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Bacon, Earl C.  
Buckbee, J. C., Co.  
Dull, Raymond W., & Co.  
Fuller Engineering Co.  
Improved Equipment Co.  
Schott, Dr. Otto.  
Smidth & Co., F. L.  
Yates, Preston K.

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Houston Bros. Co.  
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Louisville Fire Brick Co.  
Union Mining Co.

## FURNACES FOR SPECIAL PURPOSES.

Improved Equipment Co.

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National Mortar & Supply Co.  
Nephel Plaster Mfg. Co.  
Niagara Gypsum Co.  
Plymouth Gypsum Co.  
Reeb, M. A.  
U. S. Gypsum Co.  
Wolfe & Misner.

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Miscampbell, H.

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Weiler Mfg. Co.

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Carolina P. C. Co.  
Farnam-Cheshire Lime Co.  
Fowler & Pay.  
Houston Bros. Co.  
Kelly Island Lime & Trans. Co.  
Marblehead Lime Co.  
Meyer, W. D.  
Mitchell Lime Co.  
National Lime & Stone Co.  
National Mortar & Supply Co.  
Ohio & Western Lime Co., The.  
The Scioto Lime & Stone Co.

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Marblehead Lime Co.  
National Lime & Stone Co.  
National Mortar & Supply Co.  
Ohio & Western Lime Co., The.  
The Scioto Lime & Stone Co.  
Woodville Lime & Cement Co.

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## LIME PLASTER.

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Davenport Locomotive Wks.

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Taylor Iron & Steel Co.  
Titan Steel Casting Co.

## METAL LATH.

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Belt, C. T.

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Ersbam, J. B., & Sons Mfg. Co.  
Miscampbell, H.  
Williams Pat. Crusher & Pulverizer Co.

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Allis-Chalmers Co.  
American Pulverizer Co.  
Bonnot Co., The.  
Bradley Pulverizer Co.  
Jeffrey Manufacturing Co.  
Kent Mill Co.  
Pennsylvania Crusher Co.  
Raymond Bros. Impact Pulverizer Co.  
Sturtevant Mill Co.  
Williams Pat. Crusher & Pulverizer Co.

## RAILROAD MATERIAL.

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Atlas Car & Mfg. Co.  
Kilbourne & Jacobs Mfg. Co.

## REINFORCED CONCRETE CURB.

Buhler Co., Edward E.

## ROOFING MATERIAL.

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Carolina Portland Cement Co.  
Houston Bros. Co.

## SAND.

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Ottawa Silica Co.  
Union Sand & Material Co.

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Dull & Co., Raymond W.  
Stephens-Adamsen Mfg. Co.  
Webster Mfg. Co.

## SAND-LIME BRICK MCHY.

American Clay Working Mch. Co.  
Miscampbell, H.

## SEWER PIPE.

Houston Bros. Co.

## SCREENS.

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Buffalo Wire Works.  
Butterworth & Lowe.  
Cross Engineering Co.  
Dull & Co., Raymond W.  
Ersbam, J. B., & Sons Mfg. Co.  
Hendrick Mfg. Co.  
Johnson & Chapman Co.  
McLanahan Stone Machine Co.  
Stephens-Adamsen Mfg. Co.  
Sturtevant Mill Co.  
Webster Mfg. Company.

## SCREEN SECTIONS.

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Cross Engineering Co.  
Johnson & Chapman Co.

## SIDEWALK, CURB AND GUTTER FORMS.

Ubbink Steel Form Co.

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## STEAM SHOVEL TEETH.

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Portable Elevators  
Stationary Elevators  
Stone Crushers  
Sand Screens



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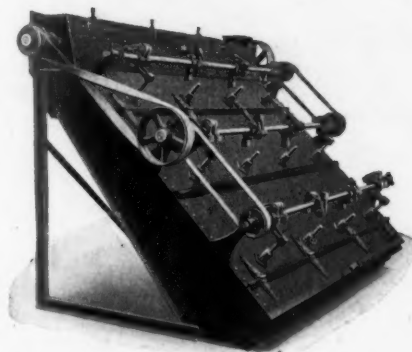
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**Novo Engine Co.** CLARENCE E. BEMENT  
222 WILLOW STREET :: :: Secretary and Gen'l Mgr.  
LANSING, MICHIGAN  
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**M**ADE in rolls.  
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members. A steel fabric of  
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in every direction.

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Chicago, Illinois

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BUFFALO, N. Y.

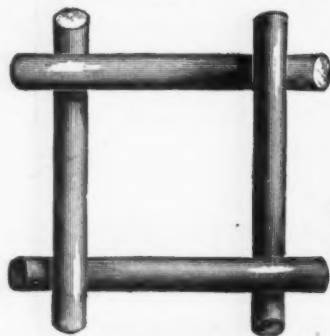
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- 3rd—The Brand—The Gandy Belt

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Sure  
To Look  
For The Belt  
With The  
Green Edge!

Remember the net cost of  
"THE GANDY BELT" is only  
one-half that of lea-  
ther belting and two-  
thirds that of rub-  
ber belting, while  
it does the work  
equally as well.  
Write for Sam-  
ples today.



**The Gandy Belting Co.**  
744 W. Pratt St. Baltimore Md.  
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## YOU CAN'T FADE 'EM

There's one "best" in every line, but that is not always best for  
everyone concerned. In the building trades

### Ricketson's Mineral COLORS

are acknowledged to be the best choice for *everybody*. Best for the  
architect because purest. Best for the contractor because they go  
farther. Best for the owner because they never change their color.

For Mortar, Brick, Cement, Stone, Etc.  
Red, Brown, Buff, Purple and Black

**RICKETSON MINERAL PAINT WORKS MILWAUKEE, WIS.**

## GRAVEL WASHING PLANTS



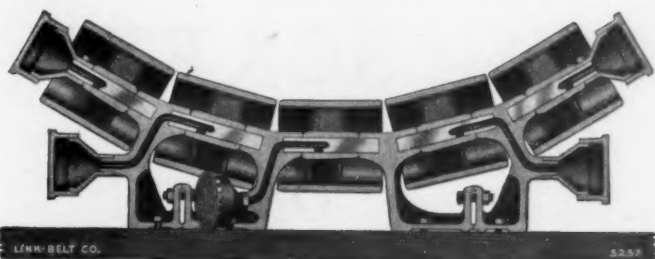
—Ask—

CHICAGO GRAVEL CO., - Chicago, Ill.  
JOLIET S. & G. CO., - Plainfield, Ill.  
PETERSON & WRIGHT, - Akron, Ohio  
SOUTHERN G. & M. CO., Brook Haven, Miss.  
About Their Plants

Stone Crushing Cement and Power Plants

**J. C. Buckbee Company, Engineers, CHICAGO**

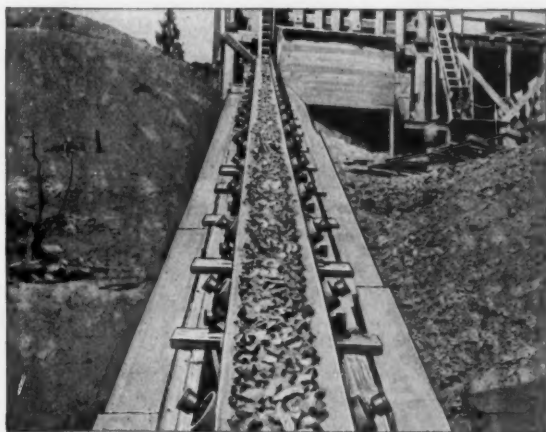
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## "Link-Belt" BELT CONVEYORS

Independent Lubrication for each Roll

We have manufactured and installed Belt Conveyors for purposes for which they were suitable for upwards of 20 years, and are furnishing the most efficient and durable equipment today



"Link-Belt" Belt Conveyor Delivering Crushed Rock from Quarry to Continuous Bucket Elevator

### "Link-Belt" Equipment Includes

Elevators and Conveyors for Every Purpose

Continuous Bucket Elevators

Screens—All Types Skip Hoists

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A complete line of power Transmission Machinery

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Address nearest office

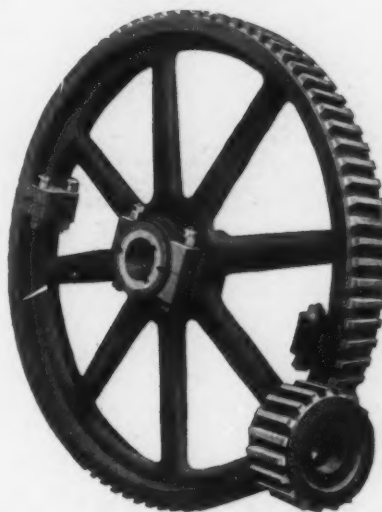
## LINK-BELT COMPANY

PHILADELPHIA CHICAGO INDIANAPOLIS

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For the machine molding process an accurate pattern of but one tooth is required. This pattern or tooth block is mechanically spaced around the circumference of the gear, insuring each tooth being a duplicate of every other tooth. The result is a gear as near perfect as a cast gear can be made.

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Gears run smooth without noise and transmit full loads without waste of power. Cost no higher than inferior gears.

Send your inquiry for prices on Screw Conveyors, Steel Elevator Casings, Pulleys, Bearings, Rope Sheaves, etc. We manufacture complete equipments of Elevating, Conveying and Power Transmitting Machinery.

Catalog No. 34 should be in your files—ask for a copy.

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THE GENERAL CRUSHED STONE CO.,  
So. Bethlehem, Pennsylvania,  
have been using one of our Common Sense Elevators for six years—  
capacity 400 tons an hour.

THE C. O. BARTLETT & SNOW CO. CLEVELAND OHIO

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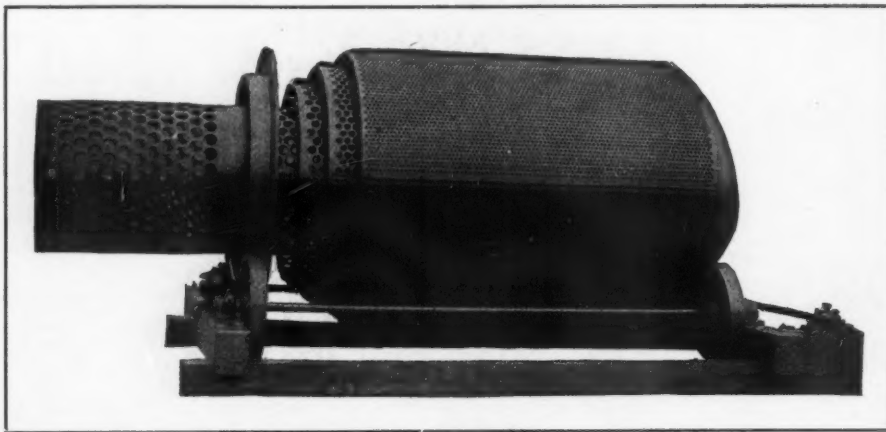
ANALYTICAL CHEMISTS

Cement, Hydrated Lime and Gypsum Plants a Specialty

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# JOHN O'LAUGHLIN'S SCREEN



made solely by Johnston & Chapman, is the

## ONLY SCREEN

on the market for wide-awake quarry-men and miners, who want to separate crushed granite, limestone or other minerals, gravel, sand, coal or coke. It will soon earn its cost in saving of repairs, and maintenance, and reduced power, and will do more and cleaner work than any other cylindrical screen of like area. No one can afford to keep old traps in use when the O'Laughlin installed

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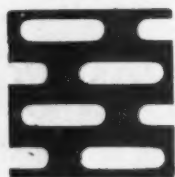
will from the moment it starts give a better and larger product, and a big interest on your investment in continuous saving in cost of repairs, renewals, and power. For particulars address:

The advantages of these screens are described in detail in a circular which WE WILL MAIL TO ANY ADDRESS. Mr. John O'Laughlin, the inventor, has designed many notable improvements in rock-drilling, quarrying, crushing and screening machinery, and uses these improved screens in his own crushing plants, which others have declared "to be the most perfect in existence in every detail." The O'Laughlin Screen is an important factor in the most modern and perfect stone-crushing plant.

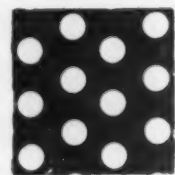
## JOHNSTON & CHAPMAN CO.

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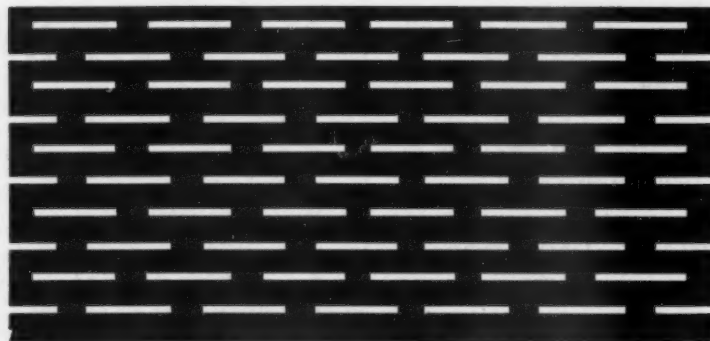
Perforators of Sheet Metals, Flat, Cylindrical, and Conical Perforated Screen Plates for Quarries, Mines, Reduction Works, Mills and all Industrial Purposes.



Screens for Stone, Sand, Gravel, Cement, Coal and for any purpose where perforated metal can be used.

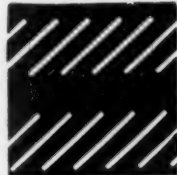
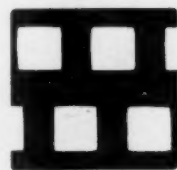


## PERFORATED MINING SCREENS IN ALL KINDS OF METAL



We are equipped to make complete screens from your own design and solicit your inquiries.

Send for Illustrated Catalog and Circulars.



BECKLEY PERFORATING CO., Garwood, N. J.

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For Limestone, Phosphate Rock, Cinder, Etc.

CAPACITIES FROM 10 TO 500 TONS PER HOUR

More easily fed and makes less fines than either a jaw or gyratory crusher. Information and prices for the asking.

WE ALSO MANUFACTURE Double Log Washers, Ore Jigs, Screens, all Iron Elevators and Conveyors. Write for catalog.

McLanahan-Stone Machine Co. Hollidaysburg, Penna.



Lewistown Foundry & Machine Co.  
LEWISTOWN, PA.

Builders of heavy duty crushers and glass sand machinery. Glass sand plants equipped complete.

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SPECIALISTS IN

Engineering Cement Works  
AND  
Cement Making Machinery

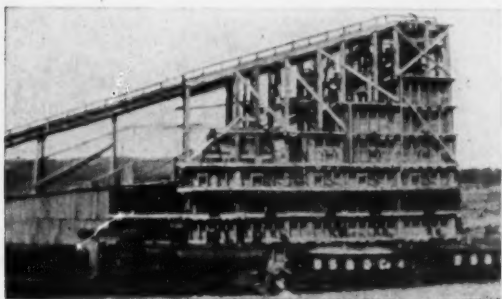
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**We Equipped More GRAVEL WASHING PLANTS During 1911 Than Any Other Company**

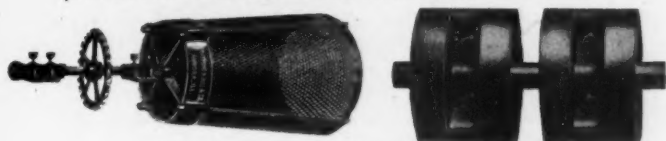
**WE MADE GOOD ON ALL**

Stone Crushing Plants  
Sand and Gravel Plants

Lime Plants  
Conveying Systems



(BARNES SAND AND GRAVEL CO'S PLANT, PORTSMOUTH, OHIO)



**Can You Imagine Anything Better**

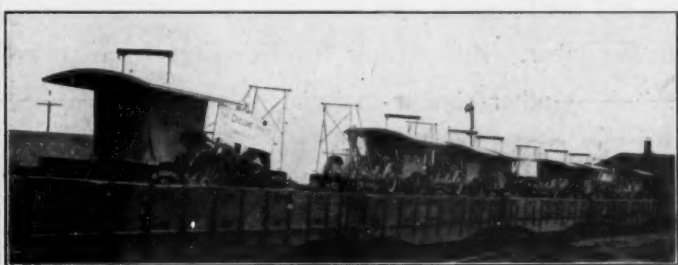
Than a Plant Equipped with the Improved Conical Quick-Change Washing Screens, Handy, Efficient, Reliable and the Belt Conveyors with Indestructible Heavy Steel Idler Pulleys, and Separating Boxes which Automatically take the Sand from the Muddy Water?

Ask the following people how they like our machinery.

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Richardson Sand Co. - Chicago, Ill.  
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Barnes Sand & Gravel Co. - Portsmouth, Ohio  
Reed Sand Co. - Elgin, Ill.  
Palmyra Sand Co. - Palmyra, N. Y.  
J. E. Carroll Sand Co. - Buffalo, N. Y.  
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G. W. Bunker Co. - Grand Rapids, Mich.  
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*We can possibly refer you to others in your vicinity—Write us.*

**RAYMOND W. DULL & COMPANY**  
**AURORA, ILLINOIS**



## **Big Blast Hole Drills for Quarries**

WHEN you hear Big Drill and Quarry mentioned together, it means a Cyclone Drill—they are one and the same thing; it is the machine that is effecting a saving of from 25 to 75% in producing stone.

The largest quarry installation in the United States, the largest in Canada and the largest in Europe is made up of Cyclones. There's a reason—would you like to know it?

Suppose we send you, say, twenty letters from men who have installed these drills and tell in these letters about the savings effected in their various quarries; would they interest you? Shall we send them? They may tell you something which will start dollars rolling your way.

Just remember that you are competing against the other fellow's cheaper production. Do you recognize the man who is really paying for the modern equipment?

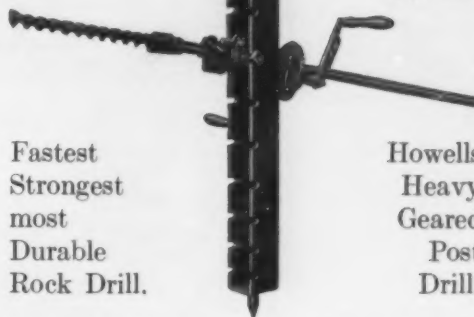
**THE CYCLONE QUARRY DRILL COMPANY**  
New York Office, 50 Church Street  
Chicago Office, 419 Fisher Bldg. **ORRVILLE, OHIO**

## **HOWELLS DRILLS**

for all purposes where drills are required. Combine efficiency and economy.

Standard  
Rock  
Drill of  
the World.

Howells  
Drills  
Bore the  
World's  
Gypsum.



Fastest  
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Rock Drill.

Howells  
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Drill.

Thousands of these drills doing duty everywhere—speak for themselves.

These drills have a record—can't be beat. Will drill from five to seven inches per minute in gypsum or soft rock.

*We make over 40 different kinds of Auger Drills, operated by Hand, Electricity and Air.*

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Plymouth, Pa., U. S. A. :: *Write for Catalogue No. 28 today*

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## THE VALVE BAG

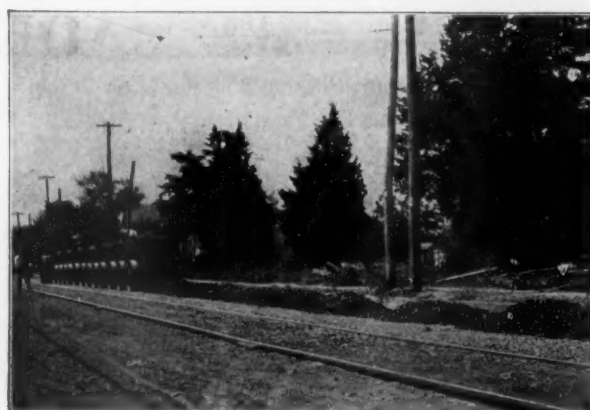
The neatest and best package for handling your *cement, lime, plaster, alca, ground stone, etc.*

## THE VALVE BAGGER

A device unequalled for sacking these products. *Your inquiries will have our prompt attention.*

The  
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TOLEDO, OHIO

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A TRAIN OF TROYS AT ATLANTIC CITY

**"I've a big hauling job. What can your TROY Reversibles do for me?"**

Write us a note like this. We'll send you the answer from Texas and New Jersey; from Michigan and Mississippi—in fact, from every part of this country and Canada.

The answer is always the same—**50 TO 80% SAVING OVER TEAMS.** Where would that boost the profits on your job?

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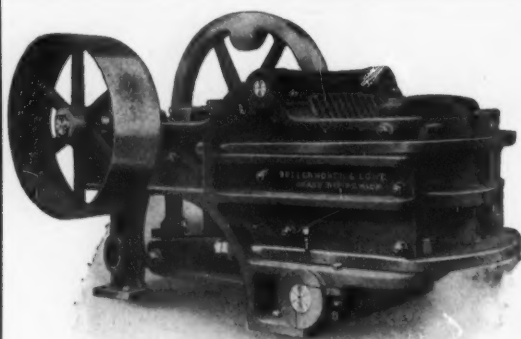
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## KING'S WINDSOR CEMENT FOR PLASTERING WALLS AND CEILINGS

Buffalo Branch, CHAS. C. CALKINS, Manager  
322 W. Genessee Street.

Not the hardest, but the toughest and best Wall Plaster made—Can be applied with less labor. Has greater covering capacity than any other similar material

**J. B. KING & CO., 17 State Street, New York.**



Nippers—17 x 19", 18 x 26", 20 x 30" and 24 x 36".

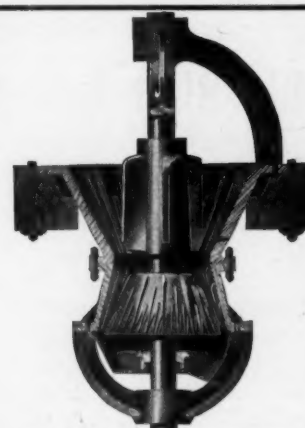
## Jaw and Rotary CRUSHERS

For all Rocks and Ores Softer than Granite

GYPSUM MACHINERY—We design modern Plaster Mills and make all necessary Machinery, including Kettles, Nippers, Crackers, Buhrs, Screens, Elevators, Shafting, etc.

Special Crusher-Grinders for Lime

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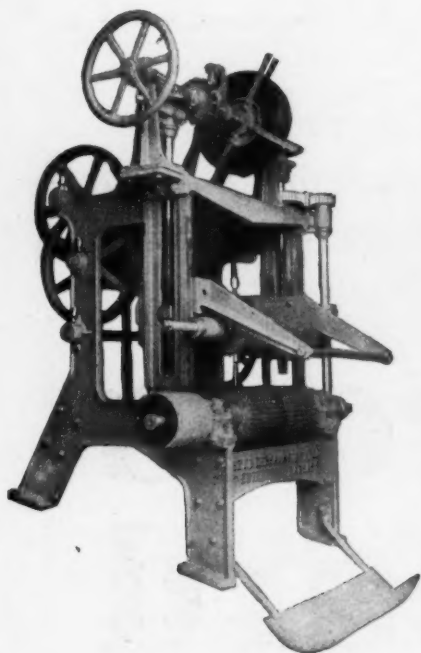


Crackers—5 sizes—many variations.

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The log feeds itself to the saw. As the log decreases in diameter the Speed of the log and of the feed **INCREASES AUTOMATICALLY**.

In other words, the Peripheral Speed remains constant.

The feed of the log to the saw is in direct proportion to the speed of the log. This automatic uniformity of feed **INSURES UNIFORMITY** of **FINE-NESS** in the **PRODUCT**.

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The Saw mandril is extra heavy and made of the best crucible steel.

The journals are chain oiling. No machine can be more substantially built. Write for full information.

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Gentlemen:—Some time ago I received a letter from you asking how the wood fibre machine you shipped us is doing. Will say it is the best I ever used. In regard to any suggestions I could make as to how it might be improved, will say that I can make none, as it is O. K.

Yours truly,

SOUTHWEST CEMENT PLASTER CO.

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Frank Dodge, Sup't.

Manufacturers of Jaw and Rotary Crushers for Gypsum, Vibrating Screens,  
Hair Pickers, Wood Fibre Machines, Calcining Kettles,  
Plaster Mixers, Power Transmission

## The Enterprise Vertical Burr Mill

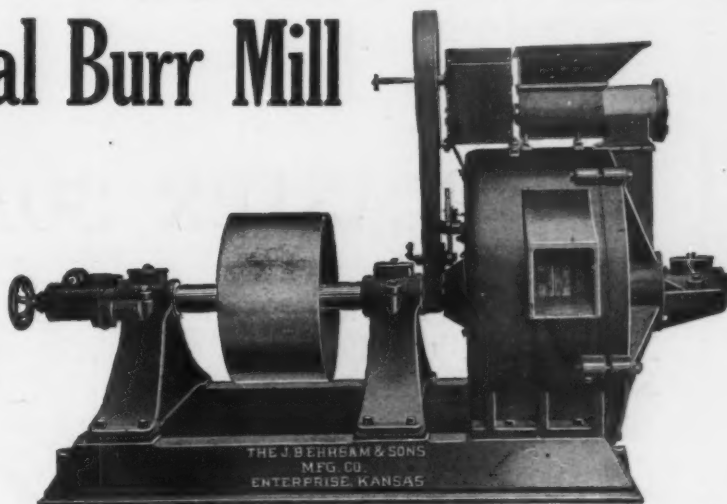
is especially designed for grinding gypsum, limestone, coal, coke, paint, rock, foundry facing, carbon, salt, and other similar substances.

It is **STRONG** and **DURABLY** built.

Has **INTERCHANGEABLE STONES**, which can be easily removed for dressing and replaced.

Is provided with our **POSITIVE CONTROLLABLE FEEDER**, which feeds an absolutely uniform stream into the mill at the required capacity.

**MANY OTHER  
ADVANTAGES.**



## The J. B. Ehrsam & Sons Mfg. Co.

Designers and Builders of

Complete Equipment for Plaster Mills

**ENTERPRISE, KANSAS, U. S. A.**

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Improved  
Modern  
Lath



Fire-Proof  
Insulating  
Sound-Deadening

# King's Fibrous Plaster Board

Standard Size 32' x 36'

## THE RESULT OF "TRADE DEMANDS"

STRENGTHENED to stand the GREATEST STRAIN to which such material is subjected  
TOUGHENED to a woody consistency to stand NAILING AND HANDLING

SHIPMENTS made to dealers of STRAIGHT OR MIXED CAR LOADS

## KING'S FIBROUS PLASTER BOARD

CALCINED PLASTER  
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MARBLE DUST

## PLASTER BOARD NAILS

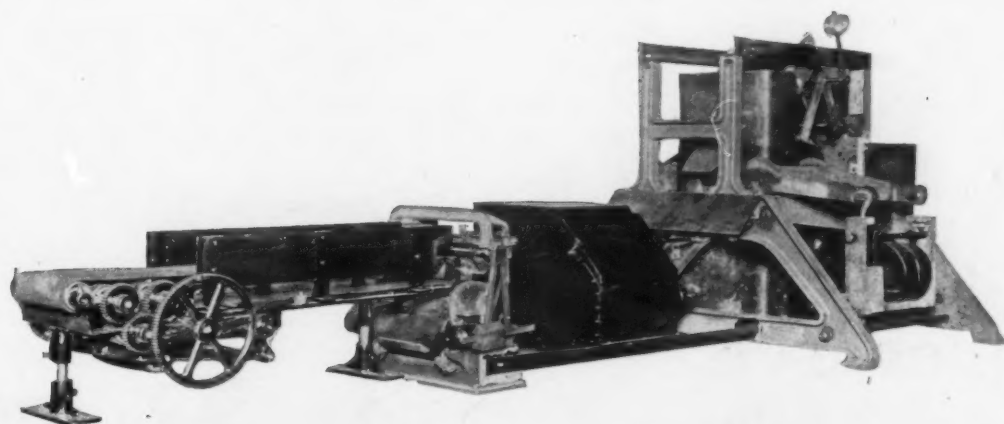
**SERVICE** The location of our works at the greatest railroad terminus in the East and our several warehouses enable us to make **Prompt Shipments at all times.**

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**WAREHOUSES:**  
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Chester, Pa. Hartford, Conn.  
Norfolk, Va. Buffalo, N. Y.  
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**WORKS:**  
New Brighton, Staten Island,  
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Cement of the highest quality is only made by the exact required proportions of

## **CLINKER AND GYPSUM**

Your chemist, with this machine, will give the desired result

### **AUTOMATIC WEIGHING MACHINE COMPANY**

134 to 140 Commerce Street, NEWARK, N. J., U. S. A.  
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Mills at

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Successors to

**The Chemical Stucco Retarder Co.**  
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The same standard quality of retarder will be produced and marketed by the same people at the right price—only a change in name of corporation.

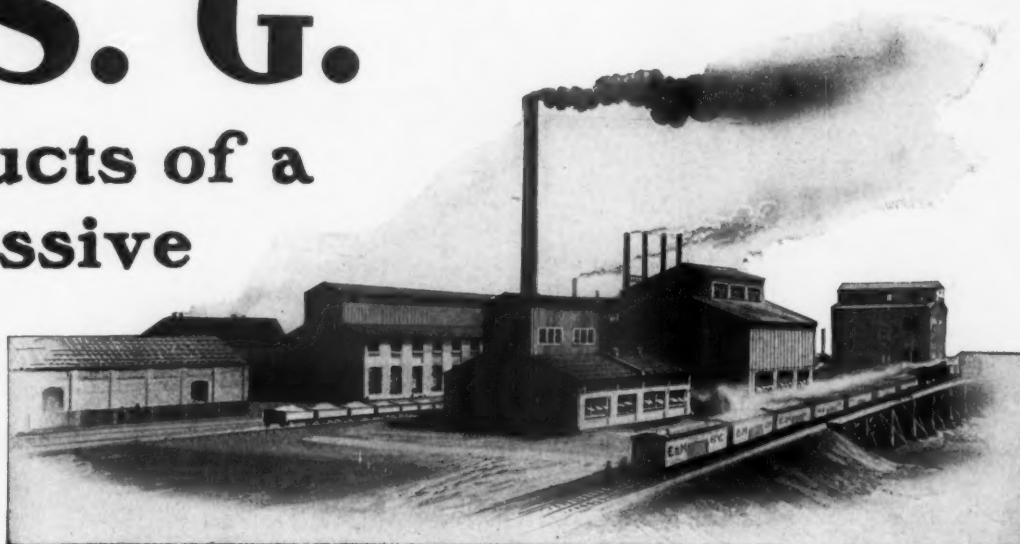
**MAIL ORDER TO NEAREST MILL FOR PROMPT SERVICE**

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# U. S. G.

## -Products of a Progressive Age

and



## The Mills That Make Them

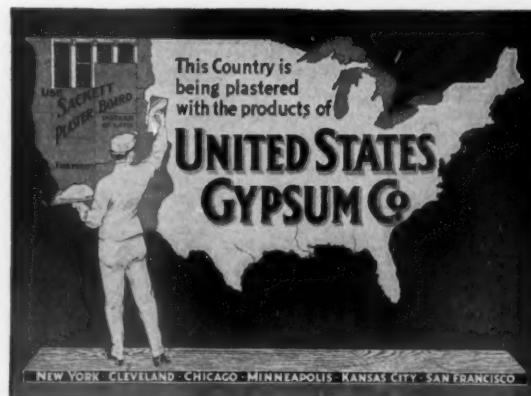
¶ Here is our standard type of U. S. G. Mill construction—the most modern and perfectly equipped plaster making plants in the world.

¶ All our mills and the machinery peculiar to our business are designed entirely by our own engineers. ¶ U. S. G. products are superior because back of the goods you have the assurance of uniform equipment, modern facilities and the established purity of our raw materials.

¶ Know U. S. G. Products and you know satisfaction. The trademark is a protection for Dealers, Architects, Contractors and owners alike—it has always stood for the very best in building materials—nothing is left undone to keep the record clean. ¶ It will pay you to do business with us for we know the full value of good service and render it every day in the year.

SACKETT Plaster Board  
Gypsinite Fireproof Studs  
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U. S. G. Cement Plasters  
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U. S. G. Products and methods will increase your business and profits and enable you to give greater satisfaction to your trade.



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Wall Plasters Have Greater Covering Capacity, Work Smoother Under the Trowel and Have Greater Final Strength

**Niagara Neat Cement**

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In 100-lb. Jute Sacks and 80-lb. Rope Paper Sacks. Mixed Car Loads of Wall Plasters, Hydrated Finishing Lime, Plaster Board, Land Plaster and Calcined Plaster for Finishing Purposes. These Products Mean Money to the Dealers in Builders' Supplies. Write today for prices.

**NIAGARA GYPSUM COMPANY**  
**BUFFALO, NEW YORK**

## Dakota Plaster Co.

WE MAKE THE FAMOUS

**"Black Hawk"**

AND

**"Dacotah"**

**Hair and Wood Fibred Plaster**



Our Plaster is pure white; uniform in color; carries more sand, works easier and makes the hardest wall. Our Mill is thoroughly equipped with the most modern machinery, and we are always in a position to make prompt shipment. We guarantee every sack of our plaster.

**Dakota Plaster Co.** Rapid City, S. D.  
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**CUMMER CONTINUOUS PROCESS**

FOR

**CALCINING  
GYPSUM**

NO KETTLES  
USED

PLANTS IN  
OPERATION

Great Saving in Cost of Manufacture and Quality of Product Guaranteed.

The F. D. CUMMER & SON CO., Cleveland, O.

## THE STUCCO THAT STICKS

Most architects and builders have had trouble with stucco work cracking and peeling off. They have also found it difficult to get a uniform color that will last. The solution of these troubles is the use of

**"ORIENTAL" STUCCO**

MADE IN ALL COLORS

**ALSO BASE COAT**

Prepared stucco, shipped anywhere. Just add water and it's ready to apply. Remember: Oriental Stucco is slow setting, bonds perfectly and will not peel off. Its color is permanent. Superior to cement and sand stucco. Also manufacturers of interior colored finish. Write for catalog and color card.

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**PLYMOUTH PLASTER  
WOOD FIBER PLASTER  
PLYMOUTH FIREPROOF  
PARTITION BLOCKS  
PLASTER BOARD  
STEEL STUDDING**

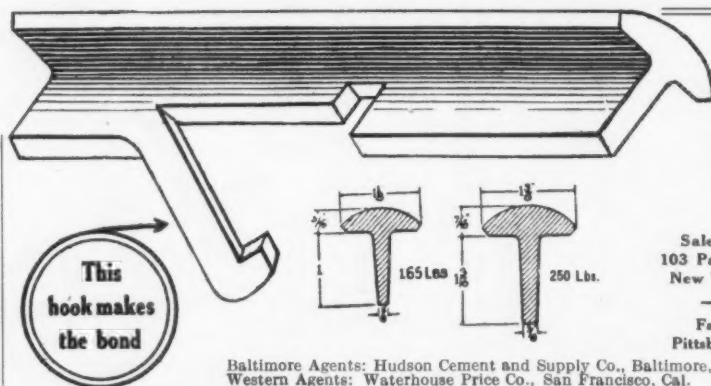
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WRITE US FOR PRICES AND  
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**Plymouth Gypsum Co.**

Fort Dodge, Iowa

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Is a steel member to be embedded when the concrete is poured, forming a permanent projecting edge and acting as a re-inforcing member as well. City engineers and contractors who have had trouble with the old sand-stone curbs or with plain concrete curbing, realize the need of a curb whose corner is properly protected against wear. Write for circulars.

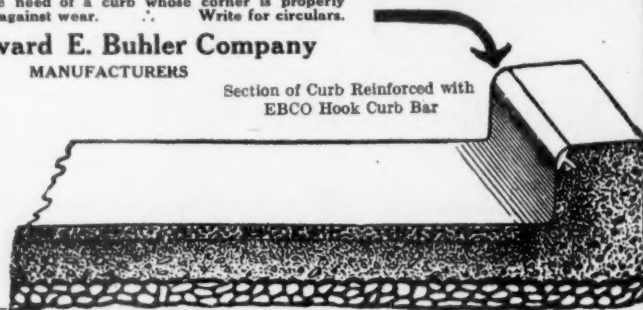
**Edward E. Buhler Company**

MANUFACTURERS

Sales Office:  
103 Park Avenue  
New York City

Factory:  
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Section of Curb Reinforced with  
EBCO Hook Curb Bar



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When you have looked  
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## ROCK PRODUCTS

and you still don't  
find what you want  
drop a line to

## ROCK PRODUCTS

**Information Bureau**  
**537 SOUTH DEARBORN ST.**  
**CHICAGO - ILLINOIS**

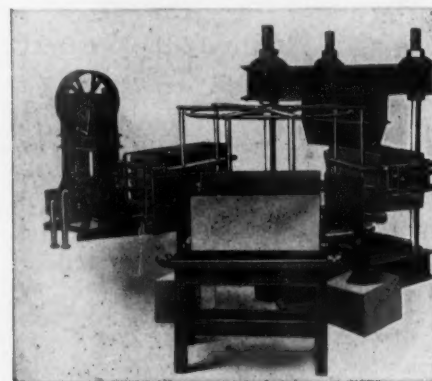
## WET PROOF BLOCKS

**STRONG**

**NON ABSORBENT**

**DENSE**

The kind you can guarantee and the kind that will keep you in business.



### We Guarantee This. Why?

BECAUSE we ram a wet mixed Concrete by powerful Hydraulic blows. We supply the Cement at the time of mixing with sufficient water to produce perfect initial setting and the aggregates driven together held by suction permit perfect bonding. We follow these principles.

**THIS MACHINE DOES THE WORK. WE LEAD, OTHERS FOLLOW. WE BUILD YOUR BUSINESS AND MAKE YOU MONEY. WE EQUIP YOUR PLANT WITH MACHINERY AND ALL THE ATTACHMENTS COMPLETE.**

Our Machine makes 1000 blocks per day under powerful Hydraulic ramming of a wet mixed Concrete. No skill labor required.

Two men make more blocks with our system, than four men using any other machine. We make any style and shape blocks—and don't be misled for we make hollow block-angle blocks—veneer slabs face down in any design from the size of a brick up to the dimension stone.

We guarantee the machinery and sell it on its merits.

Before purchasing write us—or better still come and see and be convinced.

**THE FISHER HYDRAULIC RAMMING MACHINERY**

1109 Kilburn Avenue

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Rockford, Ill.

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## Anchor Automatic Tamper

This great labor saving machine does not require any room in your factory except the space directly above the mold box. It is suspended from heavy frame work on the ceiling. Can be adjusted to fit any machine or used for all kinds of special work. The eight tampers are raised by roller crank-arms and each tamper strikes the concrete 75 times per minute. Better look into this little wonder.

## Anchor Block Machines

Made in two sizes. Our "Standard" makes blocks that lay in the wall 8 inches in height, and 24 inches in length, of any width, such as 8, 9, 10, 11 and 12 inches, five sets of face plates. Our "Junior" makes blocks 8 ins. in height and 16 ins. in length, of any width such as 8, 9, 10, 11 and 12 ins., four sets of face plates. Get our Catalog.

## Anchor Adjustable Silo Block Machines

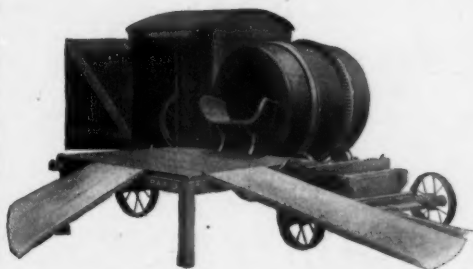
Made in two sizes. The "Standard" makes blocks that lay in the wall 8 inches in height, 24 inches in length, of any circle from 12 ft. to 20 ft. The "Junior" makes blocks 8 inches in height, 16 inches in length, making any circle from 12 ft. to 20 ft.

Continuous Air Space is the principle upon which lies the prestige of Anchor Concrete Blocks and Silo Blocks. They are giving the only perfect result—a dry inner wall, impregnable to heat, cold or moisture. Investigate this system of block construction by sending for our catalogue and information.

**Anchor Concrete Stone Company** ROCK RAPIDS, IOWA

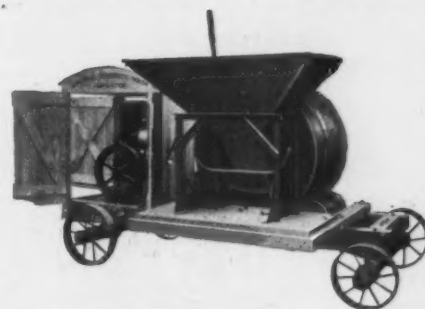
## "The Standard" Low Charging Concrete Mixer

In addition to our regular low charging mixers, we also have special designs for peculiar requirements, such as:



"THE STANDARD" Low Charging Mixer with Folding Platform.

(Shown in illustration Platform down in mixing position.)



"THE STANDARD" Low Charging Mixer with belt drive.

"THE STANDARD" Low Charging Mixer with cart charging arrangement.

"THE STANDARD" Low Charging Mixer with discharging trough for street work.

"THE STANDARD" Low Charging Mixer with hoist for mixed concrete.

The Eclipse Stone or Block Machine.

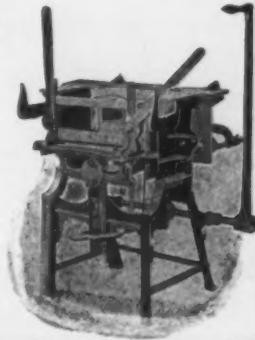
The Perfect Brick Machine.

Gas and Gasoline Engines.

"THE STANDARD" Low Charging Mixer with removable Charging Hopper.

"The Standard" Hoists and Elevators.

Steam Engines and Boilers.



Ask for catalogue No. 33. The information in this catalogue will be of value to you.

## The Standard Scale & Supply Co.

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PITTSBURGH, 243-245 Water St.  
NEW YORK, 136 West Broadway

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Equip yourself *now* with **The Peerless**—the original hand power brick machine with automatic Tampers.

Makes brick face-down and delivers them face-up. One man operation.

Large variety of face plates with machine.



CAPACITY. 12,000 PER DAY.

*Cement is at the lowest price ever known. Buy the machine that will make money for you. Write for catalogue and booklet on cement brick*

### Peerless Brick Machine Co.

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## The MORRILL SYSTEM of STEEL FORMS

Reduces Cost, Eliminates Waste of Lumber and Labor



Note the "Swing Up", 30 feet (15 plates), raised in 10 minutes.

**Simple—Rigid—Indestructible**  
Any man can put it up. Adjustable to any dimensions and any thickness.

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All wedge connection—locked and unlocked by a stroke of the hammer. Adopted on hundreds of buildings for Real Estate Companies, Railroads, and Foreign Contracts.

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If you wish to attain this you should combine these three important features:

### Wet Process, Face Down, Damp Curing.

The PETTYJOHN INVINCIBLE Machine does this, and is the only machine that does. Tandem Invincible makes two blocks at once. Price \$85.00 and up. Single Invincible, \$35.00 and up. With our Triple Tier Racking System green blocks can be stacked three high direct from machine with inexpensive home-made rigging. Plans and blue prints free to customers. It economizes space, reduces off-bearing distance and above all insures slow, even, damp and perfect curing and bleaching.

Write for our latest edition of "Stone Making," a book of valuable data, just off the press—FREE.

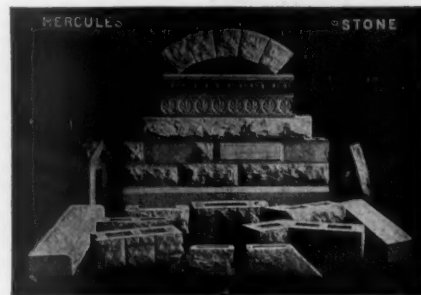
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Terre Haute, Indiana.

## Hercules Blocks

### Sell on Sight



The dense non-porous blocks of Cement Stone made on

### Hercules Block Machines

satisfy the eye of the most critical architect or house builder. It is one of the chief merits of the Hercules Machine that it permits blocks to be made of WET concrete. This results in greater density, greater strength and greater water proofness. The Hercules is the only machine that expands with the requirements of your business. The only machine that makes dimension stone up to Six Feet long.

The Hercules is built upon one solid frame 6 feet long. If your demand is just for an 8x8x16 block, you only need the mould box for that size. As your trade increases, you merely add new plates to be attached to your original machine. You don't have to buy a new machine every time you wish to make a different size. There are many other points connected with Hercules machines you ought to know. These are fully told in a "little book" we have just issued. Send for it today.

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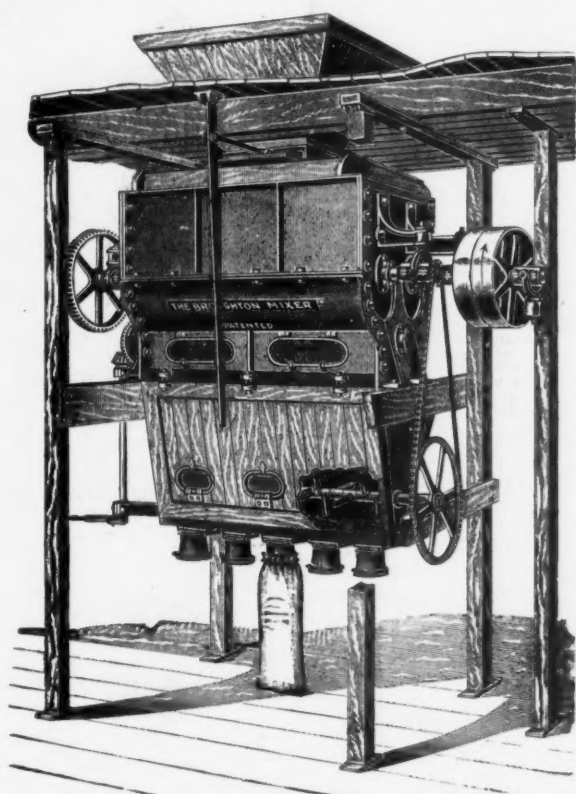
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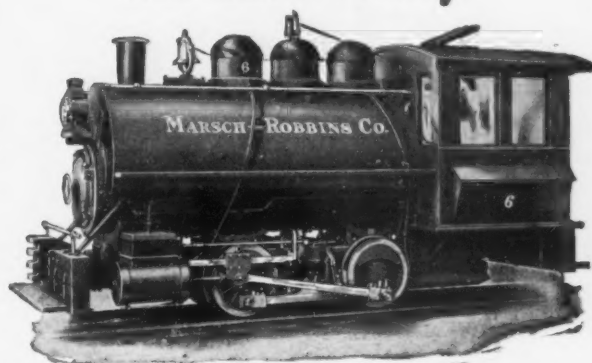




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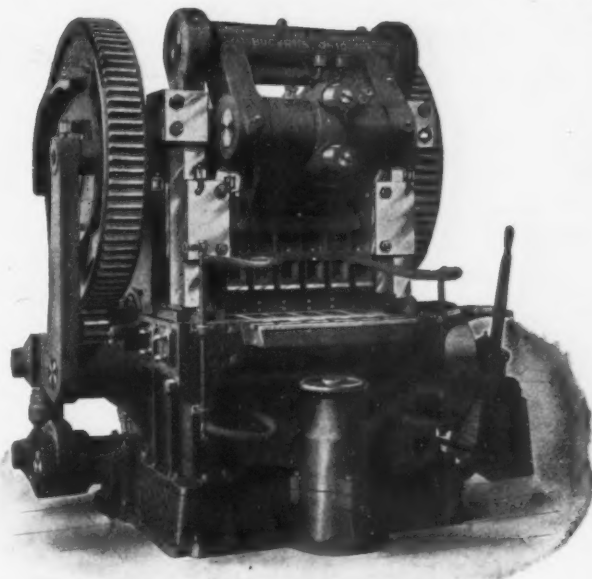
F. H. Hopkins & Co., Montreal, Que., Canadian Representatives.

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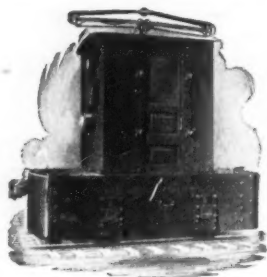
Everything we sell we make. We therefore know its quality to be right.



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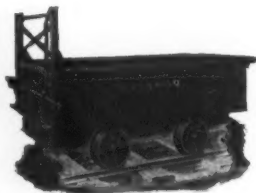


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